

THE UNITED STATES ARMY MEDICAL DEPARTMENT JOURNAL

FORCE HEALTH PROTECTION

April - June 2009

Perspective MG Russell J. Czerw	1
Joint Environmental Site Assessments in Support of Global Basing LTC Timothy G. Bosetti, MS, USA	6
Evaluation of Exposure Incident at the Qarmat Ali Water Treatment Plant Coleen Baird Weese, MD, MPH	10
Cohort Case Studies of Acoustic Trauma in Operation Iraqi Freedom MAJ D. Scott McIlwain, MS, USA; MAJ (Ret) Brian Sisk, AN, USA; Melinda J. AuD	14
Provider Resilience: The Challenge for Behavioral Health Providers Assigned to Brigade Combat Teams LTC (Ret) Larry Applewhite, MS, USA; LTC (P) Derrick Arincorayan, MS, USA	24
The Unit Field Sanitation Team: A Square Peg in a Round Hole LTC Timothy Bosetti, MS, USA; CPT Davin Bridges, MS, USA	31
Prisoner of War Camps: Lack of a Revolution LTC Jennifer Caci, MS, USA; LTC Joanne M. Cline, MS, USA	34
The Reporting and Recording of Unspecified Malaria in the Military, 1998-2007 LTC Joseph K. Llanos, MC, USA	42
Improvement of Force Health Protection Through Preventive Medicine Oversight of Contractor Support MAJ Scott A. Mower, MS, USA	46
Health Sector Development in Afghanistan: The Way Forward Maj Paul Brezinski, MSC, USAF; et al	51
Army Transformation and Level II Preventive Medicine within a Deployed Division Task Force MAJ Kenneth D. Spicer, MS, USA	58
Control of Concealing Vegetation Along Rural Routes in Iraq CPT Dennis M. Rufolo, MS, USA; MAJ Rebecca A. Zinnante, MS, USA; CPT Ryan Bible, MS, USA	62
Fort Carson: An Army Hearing Program Success Story CPT Leanne Cleveland, MS, USA	67
Establishing a Base Camp Assessment Program for a Forward Operating Base CPT Davin Bridges, MS, USA; LTC Timothy Bosetti, MS, USA	76
Army Force Health Protection: Past, Present, and Future E. Wayne Combs, PhD, RN	81

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**THE UNITED STATES ARMY
MEDICAL DEPARTMENT**

A Professional Publication
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JOURNAL

Online issues of the *AMEDD Journal* are available at <https://secure-akm.amedd.army.mil/dasqaDocuments.aspx?type=1>

April – June 2009

The Army Medical Department Center & School

PB 8-09-4/5/6

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The *Army Medical Department Journal* [ISSN 1524-0436] is published quarterly for The Surgeon General by the US Army Medical Department Center & School, ATTN: MCCS-HSA Ste 135, 1750 Greeley Road, Fort Sam Houston, TX 78234-5078.

CORRESPONDENCE: Manuscripts, photographs, official unit requests to receive copies, and unit address changes or deletions should be sent to the *Journal* at the above address. Telephone: (210) 221-6301, DSN 471-6301.

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Perspective

Major General Russell J. Czerw

Force health protection is a term that, on the face of it, appears to represent a straightforward and easily definable concept. Indeed, Army *Field Manual 4-02* characterizes it as follows:

Force health protection encompasses the pillars of a healthy and fit force, casualty prevention, and casualty care and management.^{1(p1-1)}

However, the old proverb, “the devil is in the details” is nowhere more applicable than here. An examination of each of those elements reveals the levels of research, commitment, planning, application, and resources that are necessary to achieve the desired result—a healthy, fit Warrior in a sustainable, effective fighting force.

The second element, casualty prevention, is especially deceptive in its seeming simplicity. However, as *Field Manual 4-02* expands casualty prevention into its components, the complexity and scope inherent in that effort begin to emerge:

The second pillar...concerns both the enemy threat and the medical threat....To counter the medical threat, comprehensive medical and OEH* surveillance activities, preventive medicine measures...and field hygiene and sanitation combined with personal protective measures (such as the correct wear of the uniform and the use of insect repellent, sun screen, and insect netting) must be instituted and receive command emphasis. These activities must be conducted continuously—during mobilization, predeployment, deployment, postdeployment, and demobilization.^{1(p1-2)}

Of course, the factors contained in the above description are a combination of the easily understood and intuitively obvious, (ie, sun screen) and those that require dedicated resources, specialized training, and often external support (ie, medical and OEH surveillance, hygiene, and sanitation). As our understanding of the interactions (including causes and effects) of humans and our natural and man-made environments expands and evolves, we are still learning the true extent and importance of those relationships. Fortunately, research and proactive efforts in the



environmental sciences are recognized for their direct contribution to the medical sciences, and collaboration between the disciplines is resulting in healthier populations where and when the knowledge has been applied. This is yet another area where the synergistic effect of efforts by both military and civilian resources produces results beneficial to both general populations and military mission accomplishment.

The articles within this issue of the *AMEDD Journal* are excellent examples of the work by our military medical professionals in various aspects of force health protection. The subject matter runs the gamut from field sanitation to the development of a functioning national health care structure in Afghanistan, with articles presenting research projects, addressing preventive medicine programs, and looking at the absolutely critical area of the health and well-being of behavioral health providers assigned to combatant commands. This collection offers true insight to the diversity and complexity of preventive medicine's contributions to force health protection, and is another testimony to the dedicated men and women of military healthcare who work tirelessly to support our Warriors who must go into harm's way.

*Occupational and environmental health

The US military has always been structured for force projection, taking our combat capability wherever in the world it is necessary to provide armed forces for combat operations, combat training, or humanitarian assistance. Of course this has been our capability for many years, and the potential for disease in deployment areas has been addressed since the late 1800s. However, only in the last several decades has the potentially detrimental effects of environmental factors on Soldiers' health become a vital consideration in the planning and execution of deployments and operations. LTC Timothy Bosetti's carefully detailed article explains the joint environmental site assessment process that has been developed and implemented to project and minimize potential environmental hazards to our personnel. The assessment also allows planners to take measures to protect the environment itself from harm resulting from the deployment. LTC Bosetti's article also addresses an interesting, related, and increasingly important purpose of environmental assessments; the documentation of existing conditions as a baseline for answering third party claims with regard to environmental damage.

Unfortunately, even though the initial environmental assessment will be accurate and complete, future environmental damage attendant to heavy combat operations is usually unavoidable. Dr Coleen Weese returns to the *AMEDD Journal* with an article chronicling such a situation involving potential hazardous chemical exposure to both civilian contractors and Soldiers in Basra, Iraq, in 2003. The article describes the incident and the correct response of the onsite Army preventive medicine personnel in their initial evaluation and request for a special medical augmentation response team-preventive medicine (SMART-PM) from the Army Center for Health Promotion and Preventive Medicine. The team quickly arrived and made detailed assessments of the incident, potential health effects to individuals, and the protective actions taken to mitigate the hazard. This case is of particular interest because it was the subject of congressional hearings due to a lawsuit, and was referred to the Defense Health Board for review. Dr Weese's article is an excellent illustration of the structure in place to address environmental hazards, and the capabilities of the SMART-PM to augment deployed preventive medicine resources when those capabilities are insufficient to ensure the health and safety of involved personnel.

MAJ Scott McIlwain and his coauthors have contributed a well-researched, carefully developed article detailing a clinical study of hearing trauma among Soldiers involved in operations in Iraq in 2006. The article examines current research on the physiology of hearing trauma in detail, with particular emphasis on the damaging noises experienced during deployed military operations, in both combat and noncombat situations. Those research findings are applied to the results of cohort case studies of hearing trauma patients in Iraq. The resulting conclusions indicate much progress has been made in the emphasis on hearing protection, examination, and treatment by troop leaders and headquarters, and the recommendations are logical extensions of the methods and techniques that have achieved such measurable success. Their study is yet another example of the progress and improvements military medicine continues to make in preparing our Warriors for the entire spectrum of hazards of the combat environment.

The July-September 2008 issue of the *AMEDD Journal* focused on behavioral and mental healthcare of our Soldiers as they face the demands and stresses of the Global War on Terror. In one article, Boone et al² described provider resiliency training, a program of instruction implemented by the Army Medical Department to prepare those charged with saving lives in the worst of environments for the stress and potential psychological pressures they will encounter. In their article, LTC (Ret) Larry Applewhite and LTC (P) Derrick Arincorayan zero in on the particular stresses and challenges faced by behavioral health providers who accompany Army brigade combat teams into the combat theater. In their excellent, well-researched article, they describe the factors that affect those providers, often subtly and without discernible symptoms, as they work to alleviate the psychological pain and suffering of "their" Soldiers. The article details how the effectiveness of the behavioral healthcare providers can be adversely affected, which is only detrimental to those whom they are supposed to help. Further, like the traumatized combat Soldier, those effects can be long-lasting, extending long after the combat zone should be a distant memory. The authors offer a series of well-reasoned recommendations for those who create doctrine and design the structure of expeditionary forces, as well as those practitioners who are, or will be, directly charged with the behavioral healthcare of our Warfighters.

As with most sophisticated things, preventive medicine must sometimes be examined at the "basic" levels to ensure that it continues to adequately address those needs. LTC Timothy Bosetti and CPT Davin Bridges examine the Army's frontline of defense against disease for deployed Soldiers, the field sanitation team (FST). Initially instituted during World War II, the FST are Soldiers specifically trained in hygiene, sanitation, arthropod control, and water and food safety. However, the authors point out that the longstanding concept for training and employment of the FST is not suited for the expeditionary, noncontiguous battlefield environment of today, and the foreseeable future. They propose that FST capabilities must be driven down to the smallest unit level, the platoon, because those sized units are often employed as outposts on today's battlefield, existing without the full range of support from the larger, parent unit. This excellent article details the considerations inherent in rethinking the FST concept, and the various factors that must be addressed to meet the needs of the modern expeditionary environment. The points made by LTC Bosetti and CPT Bridges should be carefully considered by those planning the changes to our force structure and training to accommodate the lessons learned in our current conflicts.

LTCs Jennifer Caci and Joanne Cline have contributed an article that looks at one of the unavoidable elements of warfare, prisoners of war (POWs), from a preventive medicine perspective. They examine American experience with POWs throughout our history, both as prisoners and custodians. Their in-depth research reveals that one recurring element of POW history, for both the US and other combatants, is the failure to adequately plan for the management and care of the prisoners that will inevitably be collected during armed conflicts. The authors recount the atrocious sanitation, hygiene, and healthcare situations of POWs from the Revolutionary War through World War II, and describe the circumstances that contributed to the difficulties and, in some cases, criminalities that occurred in the Global War on Terror. LTCs Caci and Cline find that, for the most part, US forces have adequately addressed the preventive medicine aspects of prisoner healthcare over the last century, but increased attention must be given to preparing those who will manage the prisoner population, especially in the current counterinsurgency environments of Iraq and Afghanistan, and undoubtedly conflicts of the future. Especially critical is the psychological

foundation that must be laid, for both the leaders and the Soldiers charged with managing the POWs. This article contains important information for everyone who is or will be involved with POWs, both in and out of the medical community.

Despite the best efforts of environmental and medical science, malaria continues to be a deadly scourge of many areas of the world. As such, it is a factor that must be considered in the planning, execution, and follow-up of all deployments into areas where it is endemic, and especially into areas where data may be inconclusive, but the environment is favorable to the disease vector, the *Anopheles* mosquito species. Symptoms of malaria may mimic those of less serious conditions, and therefore it may be misdiagnosed, or suspected but not confirmed. The serious nature of malaria mandates that all cases are reported to the military's central data repository for use by planners, and for the patient's permanent medical history. LTC Joseph Llanos investigated cases of suspected malaria, termed unspecified, among US military personnel from 1998 through 2007. He grouped the cases into a number of demographic and clinical categories, and determined those characteristics most favorable to a confirmable diagnosis of malaria. His detailed examination reveals some shortcomings in several areas of diagnosis and documentation, including recognition of malaria in initial and followup examinations, some laboratory procedures, and especially in the documentation of the diagnostic results and followup care. LTC Llanos' findings and recommendations should be carefully considered by all of us involved in patient care, especially those patients who are, or have been, involved in deployments.

A long-term presence in a maturing theater of operations allows the military to establish fixed base camps which require more sophisticated life support services than are possible in the fluid, dynamic environment of heavy combat operations. Large, concentrated numbers of personnel create heavy demands for sewage and trash disposal, pest control, availability of food and water, and other basic sanitation and hygiene support services. These functions are largely contracted, eliminating the need for Soldiers to be pulled from their military duties to perform these mundane tasks. MAJ Scott Mower points out that there are problems, however, in that contractors are often lacking in the knowledge and understanding necessary to perform the life support services to the

standards required by our standards, and have little basis to understand, or respect, contractual requirements. Further, those charged with contract oversight often have little background in preventive medicine and the environmental sciences, so problems in contract specifications, and the performance of the contractors themselves, are not recognized until serious situations develop. The remedies for these resulting problems are usually expensive, and always time-consuming. MAJ Mower presents a series of 10 well-reasoned, fully developed recommendations to create a structure to ensure that preventive medicine personnel are involved at every level of contracting for life support services. This is an excellent presentation of facts and recommendations that deserves the attention of everyone working in life support services for deployed personnel.

Air Force Maj Paul Brezinski and his team of coauthors have contributed an important paper looking at the state of the domestic healthcare situation in Afghanistan and the largely uncoordinated efforts by various entities to address the lack of care and services. As the first sentence of the article states: "Health sector development is a critical component of nation-building and a cornerstone of any exit strategy..." so it is vital for everyone involved in the country, both foreign and Afghani, to establish a functioning national health sector as quickly as possible. The limited capability and organization that does exist within the Afghanistan government is examined, but the article concentrates on the myriad of external resources that are present in the country, including military, other governmental agencies, and nongovernmental organizations. The article describes the uncoordinated, fragmented, and often isolated efforts of these multiple agencies, each approaching their contribution to health sector development as they see and understand the immediate need. However, as the authors point out, those individual, isolated cases of progress are unsustainable on their own, as ultimately the external resources must leave. Each time a pocket of such progress collapses, the credibility of the entire national effort is undermined, and nation building once again suffers a step back. Maj Brezinski et al have captured the current situation succinctly and with clarity, and have developed a scheme by which the existing, disjointed activities can be brought into a structure that will focus their efforts towards the goal of someday transitioning to a functioning, self-sustaining, Afghan national health sector.

MAJ Kenneth Spicer describes his experiences as a division environmental science and engineering officer whose unit underwent transformation and deployed to Iraq in September 2007. From that perspective, his article describes the improvement in force health protection that resulted from the transition, and he makes additional recommendations as to how the resulting preventive medicine services delivery can be further improved. In his well-organized article, MAJ Spicer relates the details of various aspects of preventive medicine across the theater, and clearly describes those areas that could benefit from further adjustments in doctrine, especially with regard to some personnel assignments. This article is an informative update on the current situation of force health protection services in Iraq.

In their article, CPT Dennis Rufolo and his coauthors describe an environmental situation which lends itself to exploitation by insurgents, often with deadly consequences. In many areas of Iraq, dense vegetation, in particular a type of large reed, crowd the edges of rural roads. This vegetation provides excellent concealment to insurgents who emplace explosive devices, and, of course, even more effectively hide the devices themselves. The authors describe the various methods that US forces have employed in attempts to eliminate the threat, but burning, cutting, and combinations of those methods have proven to provide temporary relief at best. More importantly, those methods are actually counterproductive if not performed during the correct time of the reeds' growing cycle, and are dangerous to those who must do the work. Therefore, commanders find that they must commit their Soldiers to a frustratingly endless cycle of repetitive, dangerous, difficult work. CPT Rufolo et al have closely examined the feasibility of using herbicides as a much more effective, longer lasting reed control measure, which is also much safer for the Soldiers and contractors who will perform the applications. They have identified herbicides approved by the Environmental Protection Agency which are used effectively in the United States for similar control applications. Their article describes how the application equipment currently in common use can be easily adapted for military use, and how application would be performed under supervision of certified personnel. However, this solution is not currently available to military commanders because of a presidential executive order (11850) issued in 1975 as a result of heightened sensitivity to the use of

potentially hazardous chemicals during military operations. Since the executive order was issued, great strides have been made in both regulatory oversight and the formulation of safe, effective herbicides for civilian use, but their use by the military is still severely restricted—the order allows no herbicide use, period, beyond installation boundaries. CPT Rufolo et al make a very strong case for a top-level review of the executive order in view of state-of-the-art herbicides and their long record of safe use in civilian applications. Their proposal should be seriously considered, because, unfortunately, Iraq will very likely not be the last location where our Soldiers are faced with the deadly problem of concealing vegetation.

An article³ in the April-June 2008 issue of the *AMEDD Journal* described the evolution of the Army Hearing Program, established to provide hearing loss prevention services to Army Soldiers and civilians in all environments, especially those of training and operational activities. In this issue, CPT Leanne Cleveland's detailed, well-developed article describes the implementation of the program at Fort Carson, demonstrating how dedication, planning, command support, and sheer hard work can have significant positive results for all concerned. The Fort Carson Hearing Program is one of the first full implementations of the Army Hearing Program at a large facility with an increasing Soldier population, most of whom are involved in intensive combat training and deployment rotations. The incorporation of each of the 4 elements of the program is explained in detail, with statistics to illustrate the positive results for each area. The target population of the program at Fort Carson is dynamic, as preparations for deployment and units returning from deployment often coincide. The population is also growing, as new units arrive or are created at the post. The value of the Army Hearing Program is thus demonstrated in the most demanding of stateside environments, as well as its invaluable role as a vital enhancement of the hearing protection efforts in place in the combat theaters. CPT Cleveland's excellent article can serve as a guide for a proven, working model implementation of the Army Hearing Program.

CPT Davin Bridges and LTC Timothy Bosetti have contributed an important article addressing the absolute necessity, and complexity, of preventive medicine surveillance and assessment of all troop locations in a deployed environment, even though they

may be geographically dispersed across an area of operations. Their article presents a logical development of the approach to the vital inspections and data monitoring needed to reduce disease and nonbattle injury casualties through proactive measures. For example, data gathering is only the initial phase of an assessment. That information must be analyzed to identify the hazards, evaluate the potential risks they represent, determine risk control, and communicate the information to the forces for action. This article is a clearly written treatment of the subject, packed with information, tips, and recommendations for our preventive medicine professionals on the application of the experience and the extensive skills and knowledge they already possess.

The limited health related information available to investigate the health problems of Warriors returning from the first Persian Gulf conflict in 1990 and 1991 prompted congress to mandate health evaluations of military personnel before and after deployments, and maintain that information. However, as Dr Wayne Combs explains in his informative, well-documented article, the services were slow to comply with the requirements, and practitioners were often unaware of their existence. Eventually, the standards, metrics, and reporting requirements were formalized and mandated by a DoD instruction, followed by the attendant Army regulations. The implementation of formal, structured quality assurance programs at both DoD and each of the services' medical commands has stabilized the collection and quality of the health data for military members throughout their careers, and civilians involved in operations and deployments. Dr Combs' article clearly captures the history and current situation of the data we must have to ensure the best possible healthcare and force health protection for our Warriors.

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Joint Environmental Site Assessments in Support of Global Basing

LTC Timothy G. Bosetti, MS, USA

ABSTRACT

As the US Army becomes more expeditionary and establishes forward operating bases in new locations, the need to document environmental conditions becomes paramount in the protection of the health of deployed service members and the US government from potential claims. The same holds true for exercises where the US presence may only be for a week, however, the potential impacts on force health protection and environmental claims linger for years. Balancing and synchronizing these multiple demands and requirements can be daunting. Over the past 3 years, the US Army Center for Health Promotion and Preventive Medicine – Europe has been working closely with the US Army Europe Deputy Chief of Staff, Engineer, and the US Army Claims Service Europe to conduct joint environmental assessments in support of command exercises and forward basing initiatives. The synergy and partnerships forged during this process ensure that environmental assessments are conducted to document environmental conditions, protect human health, and protect the US government against claims.

THE OPERATIONAL ENVIRONMENT

The current operational environment is one that is characterized by instability and persistent conflict. To meet this challenge, the Army is transforming to become a more expeditionary force with increased global reach. The expeditionary capability is the ability to promptly deploy combined arms forces worldwide into any operational environment and operate effectively upon arrival. Expeditionary capabilities assure friends, allies, and foes that the United States is able—and willing—to deploy the right combination of Army forces to the right place at the right time. Forward deployed units, forward positioned capabilities, peacetime military engagement, and force projection—from anywhere in the world—all contribute to expeditionary capabilities.

In support of the expeditionary capability, the Army needs forward bases and cooperative security locations. This massive effort of global restationing, repositioning, and rebasing regardless of short- or long-term positioning of forces requires an environmental assessment to ensure that we are protecting the health of deployed forces, protecting the environment, and protecting the US government from third party claims. It is critical to know the stakeholders and identify and balance the sampling requirements to properly document environmental conditions. Partnering is the key to make this happen.

STAKEHOLDERS AND REQUIREMENTS

Environmental sampling is dependent upon the perspective. But who are the stakeholders? Experience has shown that there are typically 3 major players or stakeholders: the engineers, the medics, and the lawyers, as illustrated in Figure 1. The engineers are typically involved in the real estate procurement, site selection, site layout, and construction. The engineers are also responsible for conducting the environmental baseline study. Preventive medicine personnel are responsible for conducting the environmental health site assessment, and providing an assessment of the site from a force health protection standpoint to determine if there is anything at the site that could potentially endanger Soldier health (acute or chronic). The US Army Claims Service is involved to protect the US government from third party environmental claims. To accomplish this, they also conduct environmental surveys to document environmental conditions. Three major players, 3 different perspectives, 3 different studies—one environmental sample.

Knowing the stakeholders and understanding that each has a different perspective means that the sampling plan can be coordinated to ensure the needs of all 3 parties are addressed. This partnering can have great benefits in the reduction of environmental sampling costs, not to mention the integrated sampling approach

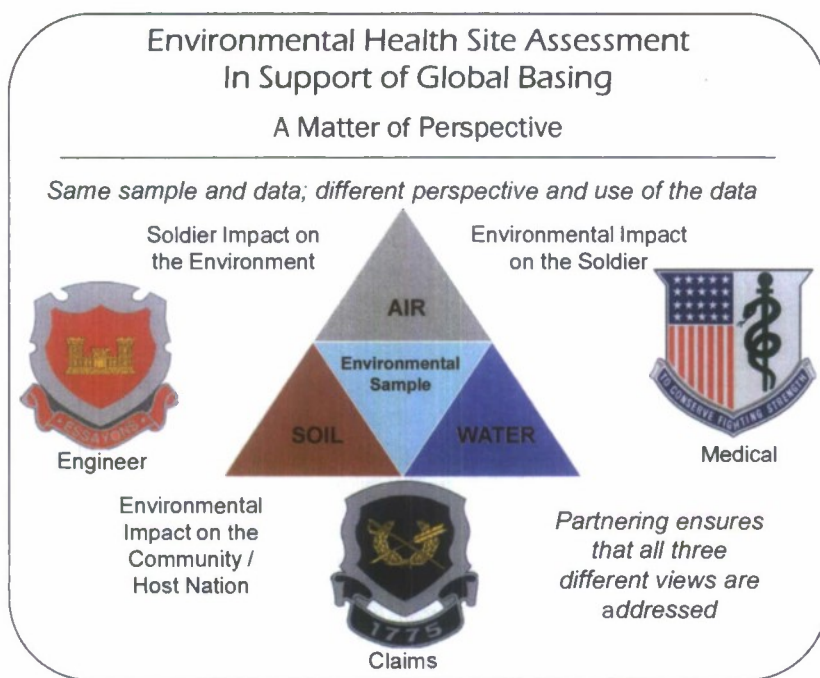


Figure 1. The primary stakeholders and their perspectives in the environmental sampling and assessment process.

that develops to ensure the different needs are met, resulting in a more thorough assessment of the site. Therefore, it is possible to take one sample that meets 3 different needs and perspectives.

At the action officer level, we all agree. However, sometimes it is the command that does not understand the importance of environmental sampling. In conducting environmental assessments or follow-on studies, the question is often asked: what is the requirement for testing? For the most part, we agree that we should do some type of baseline environmental study. However, the amount of discovery and sampling required is usually questioned. During an environmental assessment, there can appear to be a gray area, especially when it seems to fall between contingency and installation operations; it does not appear to be covered by either one. To bridge this gap, the Department of the Army issued a policy memorandum.¹ The specifics of these environmental assessments come from several different sources as illustrated in Figure 2.

Partnering can address these different requirements and ensure that the environmental sampling plan is designed to meet the different perspectives. The next step is to balance these requirements to gain efficiency in the sampling and maximize the return on our sampling investment.

BALANCE THE SAMPLING

The spectrum of sampling must be considered when developing the stakeholder requirements for environmental sampling. However, the difficult question is how much sampling is required? The other important question is what are the courses of action when you get unfavorable sample results? Also, will additional sampling be required? Too often, the second half of the question is omitted. It is only after we have discovered a problem that it becomes an issue, and we ask the question. But how do we respond to the question? Typically, we scramble around, develop a more detailed plan, and go back to the command to request more time and money. This is not a good way to approach this issue.

It is important to know the spectrum of environmental sampling, illustrated in Figure 3, and determine how much sampling will be required to achieve the objectives. This requires balancing the potential or perceived threat against the time and resources available. The ends of the spectrum are relatively easy to identify. If the site is clean, we stop. If the site is extremely contaminated, we stop. But what about the site that is in the middle? Partnering can help consolidate requirements to reduce duplicative sampling, but that probably will not be enough to balance the amount of sampling required to characterize the environmental threat and the resources available. Therefore, you need to look at alternative ways to characterize the site. One way to accomplish this is through phasing the

Standard Practice for Conducting Environmental Baseline Surveys: ASTM D6008-96²
 Environmental Health Site Assessment Process for Military Deployments: ASTM E2318-03³
 Department of Defense Instruction 6490.03: Deployment Surveillance⁴
 Joint Chiefs of Staff Memorandum MCM 008-207: Procedures for Deployment Health Surveillance⁵
 Army Regulation 11-35: Deployment Occupational and Environmental Health Risk Management⁶
 Department of the Army policies
 US Army Europe regulations

Figure 2. Sources for the requirements and specific guidelines for environmental assessments.

Joint Environmental Site Assessments in Support of Global Basing

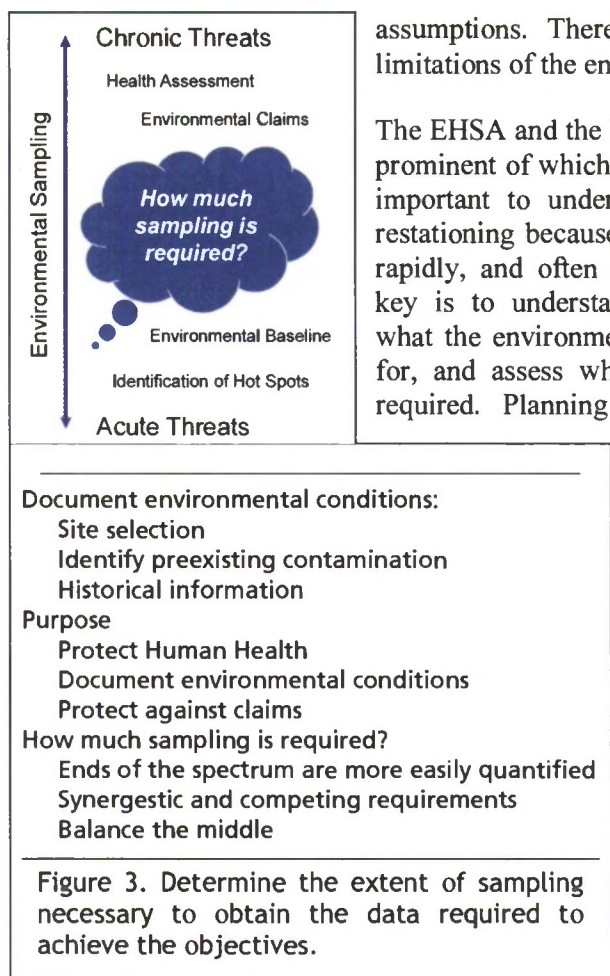
sampling: “look at the site from 30,000 feet” (broad sampling approach), then narrow the scope and focus to hot spots (areas of contamination) for more detailed assessment.

The phased approach gives us that opportunity and allows us to tailor the level of sampling effort to meet the site conditions. This works as long as we communicate those goals and objectives from the start. Therefore, a limitation of the environmental assessment is that additional sampling may be required to ensure force health protection, to properly document environmental conditions, and protect against claims.

KNOWING YOUR LIMITATIONS

The environmental health site assessment (EHSA) is required by *Department of Defense Instruction 6490.03*⁴ and Joint Chiefs of Staff memorandum MCM 0028-07.⁵ The key objectives of the EHSA are to identify exposure pathways, confirm whether they are completed or potentially completed through sampling, and conduct a risk assessment on data gathered in order to determine the impact on the deployed force.

Like the environmental baseline study (EBS), the EHSA is a living document that **must** be updated when conditions change: the site will change, the plan for the site will change, the force will change, the mission will change, and the truth will change. What we thought to be true in the early stages of the environmental assessment may turn out to be false or bad



assumptions. Therefore, we need to know the limitations of the environmental assessments.

The EHSA and the EBS have limitations, the most prominent of which are shown in Figure 4. This is important to understand with respect to global restationing because things move quickly, change rapidly, and often involve multiple entities. The key is to understand and communicate upfront what the environmental assessments will be used for, and assess whether further assessments are required. Planning and funding for additional assessments must be programmed. Flexibility is critical, phasing the assessments are a tool to accomplish this. However, you must stay engaged in the process and be attuned to changes in your base assumptions.

An example of this occurred during an environmental assessment for a forward operating site in eastern Europe. We had all 3 parties engaged and had planned a phase II assessment to characterize the site. In the phase I assessment, we had identified 2 areas that contained surface and subsurface contamination, and recommended no construction activities over those areas. The phase II assessment focusing on potential groundwater contamination was completed. Everything was going great, a model of partnering and efficiency—or so we

thought. Within a few months after the phase II assessment, we learned that troop billets were planned over the area identified in the phase I as contaminated. How did this happen? The plans for the site had changed, things had shifted for other reasons, and these changes were not communicated prior to the phase II assessment. This was not an insurmountable task to correct, but it did take time. It

- Snapshot in time**
- May not be a complete assessment
 - May only identify “hot spots”
 - May not contain information related to site layout and planned activities
 - Initial assessment is NOT the final assessment
- The truth has a date – time group**
- Facts and assumptions change over time
 - Must not be a stagnant report, but rather a living document
- Not a “box check” on a list**

Figure 4. Limitations inherent in the environmental health site assessment.

illustrates the limitations of the assessments and the need to communicate, and stresses the importance of partnering to achieve a common goal.

PARTNERING TO ACHIEVE A COMMON GOAL

Based upon the involvement of the US Army Center for Health Promotion and Preventive Medicine – Europe with environmental assessments, specifically the EBS/EHSA process, we have identified the following lessons observed over the past 3 years:

- Initial assessments are NOT the final assessment.
- The phased approach is best, and most flexible.
- There are limitations to the environmental assessment that must be articulated.
- Conducting joint surveys and data sharing is good.
- The truth will change.
- Communication is important, especially to articulate the purpose, goals, and objectives of the environmental sampling and assessments.
- Partnering is critical to success.

Partnering on environmental baseline surveys is a prudent move to ensure that environmental issues are addressed from all perspectives. This synergy can provide a consolidated effort, lower laboratory costs, reduce third party claims, standardize sampling protocols, and balance environmental sampling requirements to ensure the protection of health and safety through proper documentation of existing environmental conditions.

PARTING THOUGHT

Environmental sampling is expensive, but the results of proper discovery and documentation of existing environmental conditions are good investments in the protection of the Department of Defense from environmental claims, and ensuring that our Soldiers,

Marines, Sailors, and Airmen are living and training in places that are not going to cause adverse short- or long-term health effects.

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Evaluation of Exposure Incident at the Qarmat Ali Water Treatment Plant

Coleen Baird Weese, MD, MPH

BACKGROUND

In 2008, employees of Kellogg, Brown, & Root, Inc, filed a lawsuit alleging exposure to toxic chemicals while working to restore the infrastructure in Iraq in 2003. The lawsuit prompted Congress to hold hearings regarding the incident, and when they learned that some National Guard members served as escorts for the KBR employees, they inquired as to whether there was a potential for adverse health effects among Soldiers in these units. The United States Army Center for Health Promotion and Preventive Medicine (USACHPPM) provided information based on an assessment conducted by a special medical augmentation response team-preventive medicine (SMART-PM) which deployed at the time of the incident. To alleviate any questions regarding the assessment, The Surgeon General of the Army requested that the assessment be reviewed by the Defense Health Board.* The review was requested to assess the incident and the information gathered, determine whether the information was sufficient to assess the potential health risk, and decide whether additional actions should be taken.

The Qarmat Ali Industrial Water Treatment Plant located in Basra, Iraq, produced industrial water for use in oil production, and did not produce potable water. The site was in an urban area, enclosed by a perimeter fence, and consisted of several structures lacking sleeping or living quarters. It had been ransacked and was not functional when secured by US military forces. The site was visibly contaminated by sodium dichromate, a corrosion suppression agent used in the water treatment process. Sodium dichromate is an inorganic compound containing

hexavalent chromium known to be toxic and carcinogenic to humans and animals. Four groups worked at Qarmat Ali during the time of concern: Kellogg, Brown, & Root (KBR), a US based company contracted to restore the plant to operative status; the US Army National Guard units from Oregon, South Carolina, and Indiana, who provided personal security to KBR; the British military previously present at the site to secure the area; and Iraqi civilians hired by KBR to assist in the restoration effort.

In 2003, Army personnel were assigned to provide security for the KBR workers restoring the industrial-grade water treatment facility at Qarmat Ali, Basra, Iraq. In the summer of that year, contract work crews and safety personnel identified sodium dichromate as a potential occupational hazard in the work environment. Several US Army Soldiers reported to the supporting military medical facility and inquired about the potential health risks posed to them in their role as security detail. Concurrently, KBR initiated containment of the contaminated site and conducted environmental sampling. In-theater military occupational and environmental health specialists addressed the health concerns of the military units at a local "town hall" meeting and requested a SMART-PM conduct an in-theatre assessment. The team consisted of industrial hygienists, occupational medicine physicians, and environmental scientists. The team conducted sampling and medical evaluations for all personnel present at that time, including the Indiana Army National Guard Soldiers and Department of the Army civilians.

THE OCCUPATIONAL AND ENVIRONMENTAL INCIDENT, AND THE ROLE OF THE SMART-PM

Department of Defense Instruction 6490.03 implements policies and prescribes procedures for deployment health activities to

...control or reduce Occupational and Environmental Health (OEH) risks, to document and link OEH exposures with deployed personnel,...and to record daily locations of deployed personnel.^{1(p1)}

*The Defense Health Board is a Federal Advisory Committee to the Secretary of Defense. It provides independent scientific advice/recommendations on matters relating to operational programs, health policy development, health research programs, and requirements for the treatment and prevention of disease and injury, promotion of health and the delivery of health care to Department of Defense beneficiaries. Information available at <http://www.health.mil/dhb/default.cfm>.

The instruction requires a trained and equipped staff "to provide support to conduct disease outbreak and OEH exposure incident investigations"^{1(p6)} and to ensure reports and documentation are archived. The instruction further notes that

All exposures shall be reported that are immediately hazardous to life or health or that may significantly increase long-term health risks (eg cancer) through appropriate command channels.^{1(p6)}

Likewise, *Joint Chiefs of Staff Memorandum MCM 0028-07* requires preliminary hazard assessments be conducted at sites to summarize and identify anticipated OEH threats and hazards. This memorandum requires

...documentation in the individual medical record...of any significant occupational and environmental exposures...^{2(pA-3)}

Significant occupational and environmental exposures are defined as

Exposures to OEH hazards that will plausibly result in some clinically relevant adverse health outcome to exposed individuals...^{2(pA-A-4)}

Alternatively, routine or investigative sampling might yield a result that exceeds guidelines and was considered significant.

A preliminary or phase I site assessment may have identified the contamination if there was sufficient evidence to raise the suspicion. Alternatively, during an occupational and environmental health assessment, past practices, visible ground contamination, or other findings may have led to a more detailed and specific assessment. In this instance, visible contamination at a worksite prompted an evaluation by the contractor, and the Soldiers who escorted them to the site were concerned. Their expressed concerns prompted the request for additional assessment support through command channels. The request for a special medical augmentation response team was received by USACHPPM, and a SMART-PM staffed with personnel appropriate to the situation was formed. The team deployed to conduct sampling to assess the risk, and to provide medical evaluations and risk communication.

SPECIAL MEDICAL AUGMENTATION RESPONSE TEAM ACTIONS

Between September 30 and October 24, 2003, the SMART-PM sampled surfaces within the water

treatment plant, the air within and outside the plant, and the soil outside the plant. By the time the team arrived, the contractor had contained the contamination with an asphalt cover, and thus air sampling did not identify any samples above the Military Exposure Guidelines (MEGs) for air. The soil sampling results exceeded the MEGs for soil only outside the fence line of the plant. Prior to encapsulation, 3 of 48 samples of air were found to exceed the MEGs for hexavalent chromium. These values did not exceed the Permissible Exposure Limits, set by the Occupational Safety and Health Administration, which define the amount to which workers may be exposed for 40 hours a week for a working lifetime. However, the MEGs, designed for use on deployments, recognize that military personnel could be exposed to contaminants in air 24 hours per day, for periods from one to 15 years, if the sources were continuous. As such, the MEGs are lower than comparable workplace standards. This means that they are more conservative, and they are also set not to be an effect level at which adverse outcomes occur, but are screening values that indicate a need for further assessment. As the sampling conducted by the SMART-PM did not produce results that exceeded any limits, the concern for health effects was low.

However, as stated previously, these results were obtained following encapsulation. It was known that some samples had exceeded the long-term MEGs for chromium. To address the potential that exposures prior to encapsulation were higher, and may be of concern, it was decided that medical evaluations of those onsite should be conducted. Medical evaluations were offered to the members of both security forces and Department of Defense civilians. While KBR employees performed repairs to the plant prior to discovery and containment of the sodium dichromate powder, security forces and civilians spent much less time at the site. The routes of exposure of concern were determined to be inhalation and skin contact. The evaluations included the administration of exposure and symptom questionnaires, and medical examinations tailored to assess chromium exposure. Elements in the exams included a medical history, a general physical examination, and blood and urine testing (whole blood chromium levels, complete blood counts, serum chemistries, liver and renal function tests), routine urinalysis, chest x-rays, and spirometry testing. The medical evaluations were conducted within 30 days of the last potential exposure at the site. Under occupational standards, a physical examination

Evaluation of Exposure Incident at the Qarmat Ali Water Treatment Plant

targeting the skin and respiratory system must be conducted within 30 days of an overexposure, focusing on the presence of characteristic lesions ("chrome holes") associated with hexavalent chromium exposure. These lesions were commonly seen in occupational groups in the US which worked with hexavalent chromium at levels above the current occupational limits. The specific testing for chromium, or biomonitoring, was particularly useful in this instance. Typically, if individuals are exposed to metals, or solvents or many other types of substances, they typically "clear" the body directly or are metabolized within hours to days. For this reason, many of the biomonitoring tests are useful only if performed soon after exposure. When hexavalent chromium enters the body, it is taken into red blood cells where it remains for the life of the red blood cell, which is 120 days. Whole blood testing, which includes red blood cells, provided an indication of exposures up to 4 months prior to the test, prior to encapsulation. This testing, available at the Armed Forces Institute of Pathology, was performed.

Less than 30% of examined individuals reported symptoms, and the symptoms reported were nonspecific irritation, with eye and throat irritation being the most common. None of the individuals exhibited classical symptoms of overexposure to chromium. As might be expected when nonspecific testing is performed, some individuals were identified with minor abnormalities on urinalysis, liver function tests, pulmonary function tests, etc, but these abnormalities were minimal, few in number, and had multiple potential etiologies. Abnormal findings were not correlated with time onsite by history, and did not support a significant exposure to hexavalent chromium. The SMART-PM concluded that the reported symptoms could be related to existing personal medical conditions and desert environment-related exposures, such as heat, sand, dust, and wind. Whole blood testing for total chromium was done at the Armed Forces Institute of Pathology. Most tested individuals had levels of total chromium below the detection limit. Average values were not elevated when compared with nonoccupationally exposed general population ranges.

INCIDENT EVALUATIONS

Exposure assessment is the next step following identification of a potential hazard. Ideally, exposure

monitoring can be conducted and compared to relevant standards. Typically, if adequate sampling results in levels below standards, no further action is needed. In this instance, the initial monitoring indicated a need for further assessment, based on exceedance of the MEGs prior to encapsulation. As the MEGs are conservative, they can be used as a screening guide to direct further action. In this instance, those actions were additional sampling, which indicated that encapsulation had been a successful protective action. This was complemented by physical examination and biomonitoring, which did not indicate that significant exposure had occurred. The findings are based upon exposure assessment, including the identification and quantification of exposure, and assessment of potential risk based upon prior knowledge of dose response relationships. Analysis of the materials/specimens collected is affected by time between collection and analyses (degradation), quantity of materials/specimens gathered, and most importantly, the limits of detection. The end product of the interpretation of findings of the above analyses is a scientifically-defensible estimate of risk for the exposed individuals given the limitations of both measures of exposure and response. The estimate of risk is likely to be qualitative, such as low, medium, or high, but should dictate specific actions. These could be 1) no further action, 2) retain roster of those involved and consider passive epidemiological surveillance, 3) retain a roster of population at risk and conduct active epidemiological surveillance, and 4) recommend certain screening or other examinations at some set interval.

In this instance, estimation of the risk determined no significant risk, and no anticipation of future health outcomes. As such, the findings were communicated to the individuals involved, information was placed in their permanent medical records, and they were instructed to note the incident on their postdeployment health assessment form. When the Defense Health Board evaluated this incident, they determined that the risk assessment conducted was "timely, comprehensive, and appropriate for the potential risk posed to service members."^{3(p1)} They acknowledged that USACHPPM

met or exceeded the standard of practice for occupational medicine in regard to the exposure assessment and medical evaluation conducted in 2003 for Soldiers potentially exposed to hexavalent chromium.^{3(p9)}

They concluded that there was no expectation of any future adverse health outcomes. Additionally, they recognized that the anticipation, recognition, evaluation, and intervention in such situations often requires expertise beyond assets on the ground.

The actions taken to address the situation of the potential exposure to hazardous materials at the Quarmat Ali Water Treatment Plant are a case study of

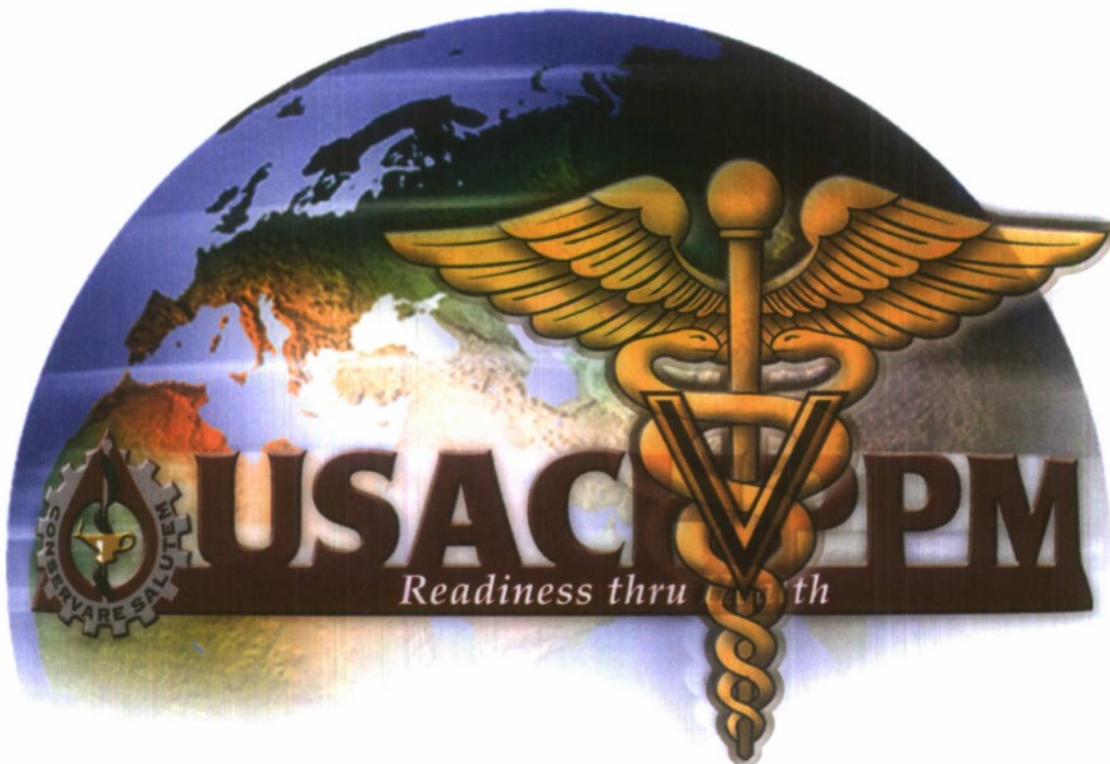
how on-scene preventive medicine and medical personnel correctly collaborate in the recognition, evaluation, and response to environmental risks in a deployed environment. Resources are available to assist in these types of situations. As was done in this case, deployed preventive medicine personnel and medical personnel are strongly encouraged to seek additional support through USACHPPM if they are faced with an exposure incident.

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Cohort Case Studies on Acoustic Trauma in Operation Iraqi Freedom

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BACKGROUND

Hearing is a critical sensor of Soldiers that is vital to both their survivability and lethality. When hearing loss is present, the ability to conduct auditory tasks is greatly diminished. Good hearing is required to perform such tasks as localizing sound, gauging auditory distance, identification of a sound source, and understanding verbal orders or radio communications. This multidimensional sense provides an indispensable amount of information on the battlefield and can mean the difference between life and death in combat. The ability to distinguish the sounds of different weapons, both friendly and enemy, is a combat-critical skill. Poor hearing jeopardizes the unit mission and increases the likelihood of a serious mishap due to a Soldier's decreased situational understanding. Verbal communications and hand and arm signals between dismounted Soldiers remain the primary means of communication on the battlefield. Although technological advances have improved battlefield communication systems, these electronic advances cannot overcome the fact that human hearing is required to complete most communication.

Sound is often the first source of information a Soldier has before direct contact with the enemy. Unlike visual cues, information carried by sound comes to us from all directions, through darkness, and over or through many obstacles. Aggressive action produces sound the enemy cannot hide or camouflage. The ability to hear and recognize combat-relevant sounds is a vital component to situational understanding and provides a tactical advantage. Noise-induced hearing loss is a tactical risk and threatens both individual and unit combat effectiveness. Hearing loss due to noise exposure usually occurs in the high frequencies. Since speech sounds that give meaning to words (for example, consonants such as ch, th, sh, f, and p) are high-frequency sounds as well as the sounds that provide the ability to determine the signature of weapons and vehicles, high-frequency hearing loss is

particularly devastating to military operations. In the heat of battle, many words can be mistaken—even more so if hearing loss is present. For example; breach and break, attack and get back, cease fire and keep firing, stay down and go around, or right car and white car. Figure 1 displays a spectrograph of the sentence "get the white car." Each speech sound from the sentence is superimposed at the location corresponding to its occurrence. The horizontal axis represents time in seconds and the vertical axis represents the frequency of the sound in Hz. The colors represent intensity. The brighter the color, the louder the sound is at that frequency. When the same sentence is filtered to H3 hearing profile levels,* the decrease or absence in intensity in the higher frequency region at the top of the spectrograph is considerable. This is a visualization of just how much speech cues are not audible in a Soldier with an H3 profile.

Outside of combat, the ability to hear still matters for safety and performance reasons. In fact, most of the 150 different enlisted jobs in the Army do not directly involve combat. Even so, most of these jobs do require combat deployments and have occupational hazards such as noise and ototoxins. These auditory hazards are compounded by 12- to 18-month deployments that have lengthy work days, no weekends, and very little free time away from work. The symptoms of noise-induced hearing loss can be deceptively subtle, usually with no obvious physical injury or wound, but the effects can be permanent, debilitating, often untreatable, and, most importantly, preventable.

LITERATURE REVIEW

During the first year of the war in Iraq, there was an average of one medical evacuation a day for hearing loss (with no other concurrent injury). Medical

*H3 hearing profile is defined by the US Army *Standards of Medical Fitness*¹ as "speech reception threshold in best ear not greater than 30 dB HL, measured with or without hearing aid; or acute or chronic ear disease."

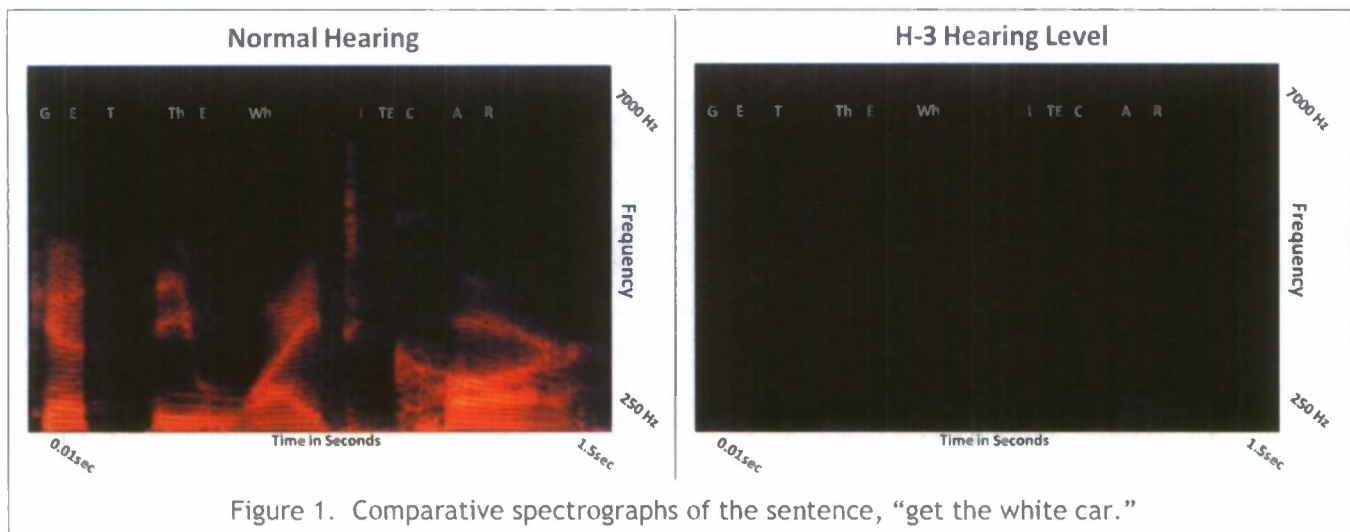


Figure 1. Comparative spectrographs of the sentence, "get the white car."

evacuations for hearing loss were sent to the audiology clinic at Landstuhl Regional Medical Center in Germany. McIlwain found that out of the 564 patients seen there during this time, 65% were from blast injuries.² Sensorineural hearing loss from friendly forces weapons systems made up approximately 25% of the injuries. The remaining 10% were balance-related or conductive type hearing loss that was predominantly unrelated to hazardous noise exposure. As a result, a military audiologist position was temporarily placed in Baghdad in 2004 to evaluate acoustic trauma patients. This provided an efficient way to determine a Soldier's hearing ability without the need for a lengthy and expensive medical evacuation for a nonlife-threatening injury. Oftentimes, Soldiers are exposed to an explosion such as an improvised explosive device or a mortar round and have no apparent injuries, but can sense their hearing has decreased and tinnitus is present. With no visible injuries, the Soldiers return to their duties. This is where the term "invisible injury" is derived.

The ability to distinguish the sounds of different weapons, both friendly and enemy, is a skill that is taught in the Army. If the sounds of weapons fire are coming from the next block of buildings, knowing whether it is enemy or friendly, small arms or automatic weapons, small caliber or large caliber, or if it is a rocket propelled grenade or an antitank weapon can be critical information that determines a Soldier's reaction. Katzel et al found that the signature sounds distinguishing a weapons system are primarily above 4 kHz.³ The frequencies above 4 kHz are also where hazardous noise affects the cochlea the most, and where the tell-tale "noise notch" occurs.⁴ Consequently, identification of noise signatures, commu-

nication, gauging auditory distances, and localization are negatively affected. Studies have shown that the ability to accomplish a unit's mission is directly proportional to its ability to communicate effectively. If effective communication drops by 30%, the ability to control the unit in order to accomplish the task drops by 30% as well.⁵

Weiner and Ross describe the resonant characteristics of the outer ear as boosting the sound pressure level of the frequencies between 2500 Hz and 3500 Hz.⁶ Donahue and Ohlin describe the middle ear as frequency selective because the transfer functions of the middle ear allow the mid- to high-frequency sounds (approximately 1500 Hz through 4000 Hz) to pass through it with considerably less resistance than the low-frequency sounds.⁴ The result is that the low-frequency sounds reach the cochlea at a lower intensity than when it entered the ear canal. Conversely, sounds at frequencies between 1 kHz and 3 kHz are transferred to the cochlea with significantly less resistance and greater intensity than when they entered the ear canal. Rudmose and Ward independently demonstrated that when high intensity pure tones reach the cochlea in the 1 kHz to 3 kHz frequency range, the resulting threshold shift occurs approximately a half to one whole octave above the pure tone exposure.^{7,8} As the waveform increases in amplitude on the basilar membrane due to an increase in sound intensity, the vibration becomes less localized and moves toward the basal portion of the cochlea.⁴ Ylikoski and Ylikoski state that this movement causes damage to loci of the cochlea that are different from the stimulus frequencies.⁹ For broad-band noise with equal energy in all bandwidths, the maximum threshold shift occurs between 3000 Hz and 6000 Hz.⁸

Studies of noise-induced hearing loss in the Global War on Terror have been analyzed. Cave found that more than 50% of 258 acoustic trauma patients seen at the Walter Reed Army Medical Center from April 2005 through August 2005, had significant hearing loss, and age could not account for the change in hearing from before to after deployment. In addition, one-half of these patients reported having tinnitus.¹⁰ Helfer data mined hearing loss associated diagnoses codes of postdeployment and nondeployed Soldiers between April 1, 2003 and March 31, 2004. He found that 68% of 806 postdeployment evaluations had been diagnosed for at least one of the following: acoustic trauma (5.6%), permanent threshold shift (29.3%), tinnitus (30.8%), eardrum perforation (1.6%), or moderately severe hearing loss or worse (15.8%). The nondeployed group had 4% of 141,050 diagnosed with the same hearing loss related codes: acoustic trauma (0.1%), permanent threshold shift (0.5%), tinnitus (1.5%), eardrum perforation (0.1%), or moderately severe hearing loss or worse (2.2%).¹¹ In 2007, the Veterans Administration Rehabilitative Research and Development Department reported that 839,907 veterans were identified as having service-connected hearing loss that required compensation from the Veterans Benefit Administration. In 2006, total compensation to Veterans was over \$1.2 billion for hearing loss and tinnitus disabilities^{12(p3)} and accounted for 17% of the total disability claims.^{12(p12)} This is an increase of 18% from the previous year and a 56% increase since 2002.^{12(p12)} These studies corroborate that the sounds of combat can be devastating to a Soldier's hearing readiness.

Bohne and Harding found that the cochlea undergoes 2 histopathologic stages after an acoustic trauma: degeneration of the outer hair cells and the continued degeneration of supporting cells, afferent nerve fibers, and additional hair cells. The second histopathologic stage has a delayed onset with respect to identification of threshold shifts with routine monitoring.¹³ Simply put, hearing loss is progressive after an acoustic assault and therefore the actual rate of hearing loss in the Army is greatly underestimated. Multiple tours of duty in Iraq and Afghanistan will accelerate this delayed onset due to lengthy work days, no weekends, and large doses of hazardous noise exposure on a regular basis. The number of servicemen and servicewomen on disability because of hearing damage will increase no less than 15% a year under current

combat conditions and disability policies.¹⁴ The US Army Center for Health Promotion and Preventive Medicine has followed veterans' disability claims since 1969. In 2008, the disability payments from the Veterans Administration for tinnitus and hearing loss exceeded one billion dollars. Unfortunately, a Government Accountability Office investigation found that the average pending and appeal process of applying for a service connected disability in 2007 was 789 days.¹⁵

Even if a Soldier's hearing thresholds are within a normal tolerance, the damage may have begun. Future hazardous noise exposure will append to previous damage and lead to future hearing loss that is not within acceptable limits for Army standards. Once a Soldier's Speech reception threshold in the best ear is greater than 30 dB hearing level (measured with or without hearing aid), their ability must be evaluated for functionality and personal risk with respect to their jobs. For instance, if a helicopter pilot has a hearing loss and poor speech intelligibility; many lives are at risk if the radio communication cannot be heard. Also, the pilot risks further hearing loss to the hazardous noise of the helicopter. If the findings of the review board are negative, the Soldier is offered a medical discharge or a change to a job that does not involve hazardous noise exposure. Even if Soldiers choose to change jobs rather than take a medical discharge, the organizational knowledge and technical experience goes with them.

VARYING EXPOSURES

The following cohort case studies were observed using air conduction hearing threshold data collected during evaluations conducted in 2006 at the US Army Audiology Clinic in Baghdad, Iraq. The 2 cohort case studies presented here are the effects of acoustic trauma while wearing hearing protection and the effects of acoustic trauma while not wearing hearing protection.

Cohort Case Study No. 1

Paired data of predeployment and during deployment hearing thresholds of 50 US Army Soldiers (100 individual ears) were randomly observed among Soldiers that were exposed to acoustic trauma while wearing hearing protection. All subjects were noise-free for at least 14 hours before evaluation. Only threshold data from Soldiers with normal type A

tympanograms were collected. Of this sample, 25 of the Soldiers reported exposure to explosions in combat while wearing some form of hearing protection and 25 that had not been exposed to explosions, but received hearing screenings as a part of routine physical exams.

During each evaluation, predeployment audiometric thresholds were compared to the current results. One Soldier in the hearing protected acoustic trauma group had one ear with a perforated tympanic membrane, so that ear was excluded from the data set, reducing the number of ears to 49. Since data were paired, no weighting for age or gender was used. The differences in thresholds predeployment and during deployment at the individual frequencies of 500 Hz, 1 kHz, 2 kHz, 4 kHz, and 6 kHz were then compared between groups with a one-way analysis of variance (ANOVA) using Statistical Package for Social Sciences (SPSS), Version 11.0 (SPSS Inc, Chicago, Illinois). Levene's statistic was used to test for homogeneity of variance at each frequency between groups. Since there were only 2 groups, no post hoc tests were necessary.

The null hypothesis: there is no significant difference between predeployment and ongoing deployment audiometric threshold levels at the individual frequencies of 500 Hz, 1 kHz, 2 kHz, 4 kHz, and 6 kHz between routine physical exam group and hearing protected acoustic trauma group. The null hypothesis was rejected for the individual frequencies of 500 Hz, 1 kHz, and 2 kHz. There was a significant difference in hearing threshold levels at these frequencies. All frequencies passed Levene's test, except 4 kHz. Figure 2 displays the mean threshold differences and error bars for each group and frequency. The descriptive statistics are displayed in the Table.

The analysis of variance at 500 Hz revealed a highly significant difference between groups, $F=9.463$, $p<0.05$ with a medium effect size (η^2) of 0.09. The analysis of variance at 1 kHz revealed a highly significant difference between groups, $F=6.076$, $p<0.05$ with a medium η^2 of 0.06. The analysis of variance at 2 kHz revealed a significant difference between groups, $F=9.657$, $p<0.05$ with a medium η^2 of 0.09. The analysis of variance at 4 kHz revealed no significant difference between groups, $F=2.707$,

$p>0.05$ with a small η^2 of 0.03. Homogeneity of variance was violated, $\alpha=0.045$, $p<0.05$. The analysis of variance at 6 kHz revealed no significant difference between groups, $F=1.607$, $p>0.05$ with a small η^2 of 0.02.

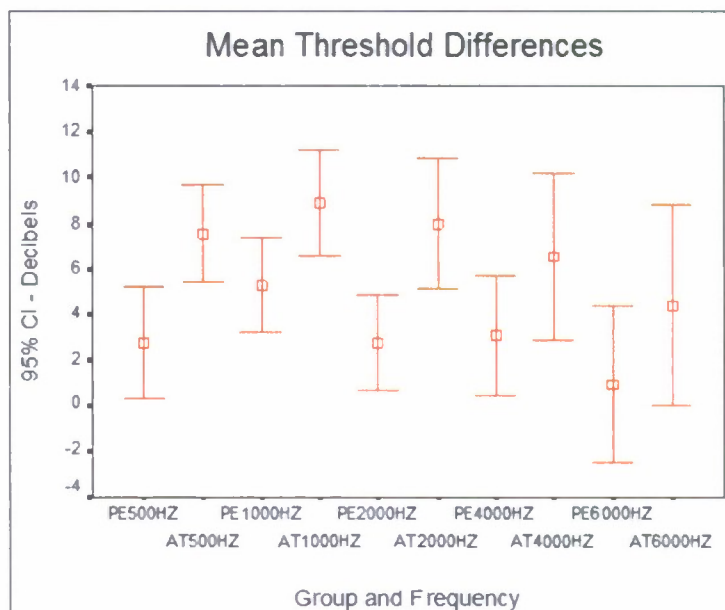


Figure 2. Graphical depiction of differences in predeployment and during-deployment audiometric thresholds between paired control and exposure groups.

Glossary

PE – routine physical exam group

AT – hearing protected acoustic trauma group

Notes

1. PE and AT are followed by the corresponding frequency in Hz
2. Decibels measurements are logarithmic.

The increase in standard deviation with the increase in frequency is notable in the postdeployment thresholds, but expected in individuals exposed to hazardous noise. An analysis of men exposed to hazardous noise in the International Standards Organization 1999 database by Bovo et al showed that male workers exposed to a noise level of 100 dBA for 30 years exhibited a hearing loss at 4 kHz with a variation of 60 dB.¹⁵ This is consistent with the findings of the hearing protected acoustic trauma group. Further, several studies attribute this variation to mechanical resonance and sound transfer function of the ear canal, the action of stapedial reflexes, and genetics.¹⁵⁻¹⁷ The significance levels were least remarkable at 4 kHz and 6 kHz due to the low power and the violation of homogeneity of variance at 4 kHz. Ferguson and Tukane describe the one-way ANOVA as being robust enough to overcome violations of homogeneity of

Cohort Case Studies on Acoustic Trauma in Operation Iraqi Freedom

Data from comparative tests of predeployment and during-deployment audiometric thresholds between paired control and exposure groups.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
PE500HZ	50	-20.00	15.00	2.6000	8.64492
PE1000HZ	50	-15.00	20.00	5.1000	7.31855
PE2000HZ	50	-20.00	20.00	2.5000	7.50850
PE4000HZ	50	-30.00	25.00	2.9000	9.15234
PE6000HZ	50	-35.00	20.00	.9000	11.76687
AT500HZ	49	-15.00	20.00	7.5510	7.29743
AT1000HZ	49	-10.00	30.00	8.8776	7.92315
AT2000HZ	49	-10.00	40.00	7.9592	9.83819
AT4000HZ	49	-15.00	50.00	6.5510	12.68047
AT6000HZ	49	-25.00	55.00	4.3878	15.39862
Valid N (listwise)	49				

Glossary

PE – routine physical exam group

AT – hearing protected acoustic trauma group

Note: PE and AT are followed by the corresponding frequency in Hz

variance.¹⁸ However, the results of 4 kHz and 6 kHz interpretation should be based on the mean and error bars in Figure 2.

The increase of hearing thresholds in the hearing protected acoustic trauma group is least remarkable at 4 kHz and 6 kHz. The attenuation characteristics of hearing protection may explain the greater protective effect of the 4 kHz and 6 kHz over the lower frequencies. Higher frequency sound energy is more easily obstructed than lower frequency sound energy in passive hearing protection. To a large extent, the wavelength of the sound is responsible for this greater attenuation in the high frequencies; the higher the frequency, the shorter the wavelength and vice versa. Generally speaking, acoustic energy is attenuated more if the earplug is greater than one-half the wavelength of the sound. Since the Soldiers in this cohort case study were wearing a variety of approved hearing protection (polyvinyl foam earplugs, combat arms earplugs, and tactical communication and protective systems), a properly sized and fitted hearing protector of any given size or style will therefore attenuate higher frequency sound with a shorter wavelength than a lower frequency sound with a longer wavelength. This is consistent with the protective effect at 4 kHz and 6 kHz in this study.

The statistical significance at 500 Hz, 1 kHz, and 2 kHz may also be attributable to the earplug preventing the acoustic reflex from occurring during the impulse noise. Fletcher found that the acoustic reflex was more effective at protecting hearing from gunfire in

frequencies below 1 kHz than the single flanged earplug. However, he also found the single flanged earplug to be most effective in frequencies 2 kHz and greater.¹⁷ This corresponds to the observed hearing thresholds of this case study, but also does not take into account bone conduction of the sound. Berger found that at 40 dB in the frequency of 2 kHz, sound reaches the cochlea via bone conduction even when hearing protection is worn.¹⁹ If we take into account the half wavelength theory mentioned in the previous paragraph, it is expected that higher frequencies are attenuated more through the human body and therefore the lower frequency sounds are louder at the cochlea via bone conduction. This also may

account for some of the difference patterns observed.

Further, Price describes the middle ear as a linear system up to 120 dB sound pressure level, and that the transfer functions of the middle ear are flat in the lower frequencies and decrease at a rate of 6 dB per octave at frequencies above 1 kHz.^{20,21} Kobrak and von Békésy found that in human cadavers' ears the stapes changed its mode of vibration at high intensities in such a way that less energy was transmitted to the cochlea.^{22,23} These studies support the idea that the middle ear can peak clip high intensity impulse noise. Since the explosions could not be meticulously measured, it is not plausible to argue that the hearing protected acoustic trauma group benefited from this middle ear peak clipping, but is worth mentioning.

Cohort Case Study No. 2

Independent samples of during deployment hearing thresholds of 81 US Army Soldiers (161 individual ears) were randomly observed in two groups: routine physical exams and acoustic trauma without hearing protection. All subjects were noise-free for at least 14 hours before evaluation. Only threshold data from Soldiers with normal type A tympanograms were collected. Of this sample, 34 of the Soldiers reported acoustic trauma in combat and 47 had not been exposed to acoustic trauma, but received hearing screenings as a part of routine physical exams. One Soldier in the acoustic trauma group had one ear with a perforated tympanic membrane, so that ear was excluded from the data set reducing the number of ears

to 67. All subjects were under 25 years of age, so no weighting for age or gender was used.²⁴ The thresholds at the individual frequencies of 500 Hz, 1 kHz, 2 kHz, 4 kHz, 6 kHz, 8 kHz, and 12 kHz were then compared between groups with a one-way ANOVA using SPSS, Version 11.0. Levene's statistic was used to test for homogeneity of variance. Figures 3 and 4 display the quartiles and outliers at each frequency. Since there were only 2 groups, no post hoc tests were necessary.

The null hypothesis: there is no significant difference between audiometric threshold levels at the individual frequencies of 500 Hz, 1 kHz, 2 kHz, 4 kHz, 6 kHz, 8 kHz, and 12 kHz between the routine physical exam group and the acoustic trauma group.

The null hypothesis was rejected for the individual frequencies of 500 Hz, 1 kHz, 2 kHz, 4 kHz, 6 kHz, 8 kHz, and 12 kHz. There was a significant difference in hearing threshold levels at these frequencies.

The analysis of variance at 500 Hz revealed a highly significant difference between groups, $F=5.485$, $p<0.05$ with a medium η^2 of 0.03. The analysis of variance at 1 kHz revealed a highly significant difference between groups, $F=6.371$, $p<0.05$ with a medium η^2 of 0.04. Homogeneity of variance was not violated, $\alpha=0.67$, $p>0.05$. The analysis of variance at 2 kHz revealed a significant difference between groups, $F=11.661$, $p<0.05$ with a medium η^2 of 0.07. Homogeneity of variance was violated, $\alpha=0.03$, $p<0.05$. The analysis of variance at 4 kHz revealed no significant difference between groups, $F=25.017$, $p>0.05$ with a small η^2 of 0.01. Homogeneity of variance was violated, $\alpha=0.00$, $p<0.05$. The analysis of variance at 6 kHz revealed no significant difference between groups, $F=17.159$, $p>0.05$ with a small η^2 of 0.01. Homogeneity of variance was violated, $\alpha=0.00$, $p<0.05$. The analysis of variance at 8 kHz revealed no significant difference between groups, $F=27.589$, $p>0.05$ with a large η^2 of 0.17. Homogeneity of variance was violated, $\alpha=0.00$, $p<0.05$. The analysis of variance at 12 kHz revealed no significant difference between groups, $F=28.736$,

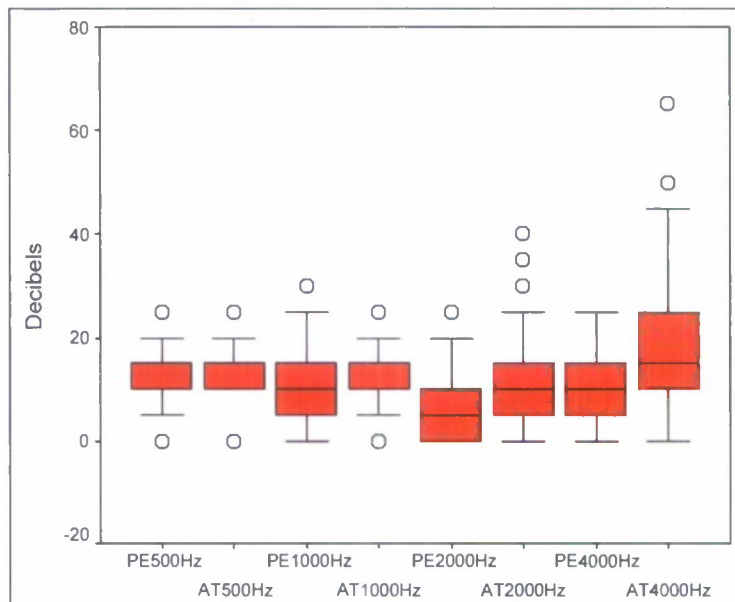


Figure 3. Median and quartiles of the data comparing subjects of the physical exam group versus those of the acoustic trauma group.

Glossary

PE – routine physical exam group

AT – hearing protected acoustic trauma group

Note: PE and AT are followed by the corresponding frequency in Hz

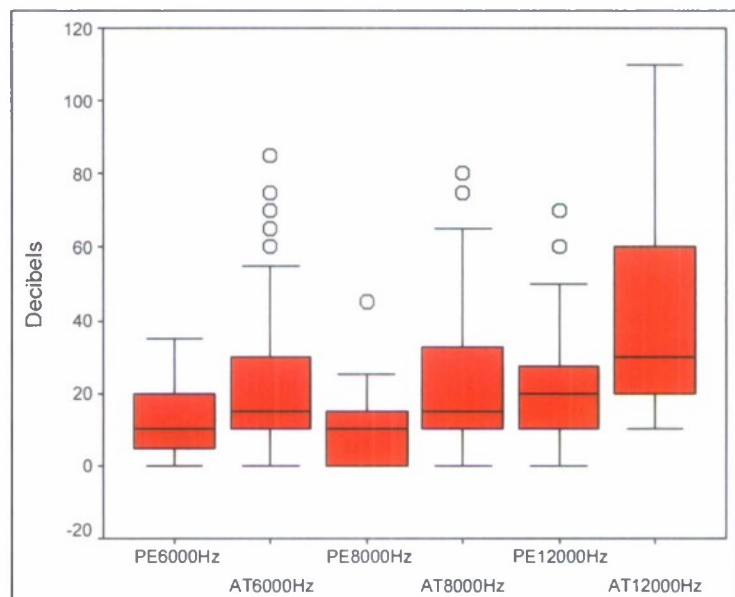


Figure 4. Median and quartiles of the data comparing subjects of the physical exam group versus those of the acoustic trauma group.

Glossary

PE – routine physical exam group

AT – hearing protected acoustic trauma group

Note: PE and AT are followed by the corresponding frequency in Hz

$p > 0.05$ with a large η^2 of 0.15. Homogeneity of variance was violated, $\alpha = 0.00$, $p < 0.05$.

The significance levels were remarkable at all frequencies. The increase in standard deviation with the increase in frequency is notable, but expected in hazardously noise exposed individuals. Several studies attribute this variation to mechanical resonance and sound transfer function of the ear canal, the action of stapedial reflexes, and genetics.¹⁵⁻¹⁷

Balatsouras evaluated extended high frequency hearing (greater than 8 kHz) in basic trainees of the Greek Army.²⁵ The purpose was to determine if there was value added to the inclusion of extended high frequency threshold testing with the standard audiology battery. The subjects had been exposed to acoustic trauma by small arms weapons fire. The conclusion was that extended high frequency temporary threshold shift subsided and there was no significant benefit from the added time and effort for conducting this procedure.

Hamernik identified impulse noise, specifically blast waves with very short durations (0.5 millisecond) and high peak intensities, as capable of producing a mechanical impulse which can result in extremely high shear stresses and premature failure of elastic structures.²⁶ He further described blast wave exposure as producing 2 fundamentally different lesion patterns: severe mechanical damage to the organ of Corti where large pieces of sensory and supporting cells were torn loose from the basilar membrane, and lesions that were more limited in extent and consisted primarily of missing or damaged sensory cells with the structural elements of the organ of Corti remaining essentially intact. This latter pattern of loss was frequently associated with damage to the tympanic membrane.

The acoustic traumas in this study were from improvised explosive devices or car bombs and the results above 8 kHz were permanent and quite large threshold shifts. This is likely due to the spectral and intensity differences in small arms fire and improvised explosive device exposure.

Improvised explosive devices (IEDs), which were used sparsely at the outset of Operation Iraqi Freedom in March 2003, now account for nearly 70% of all US casualties from hostile action in Iraq.²⁷ Understandably, the IED was the most common type

of impulse exposure in Iraq in 2006. During this phase of Operation Iraqi Freedom, most of the IEDs were constructed out of 105mm artillery shells. Price measured the impulse and spectrum of this explosive device. At 5.64 meters, the impulse has a spectral peak at ~100 Hz with an A duration of 0.3 millisecond. The second most common impulse exposure was from the standard issue M16 rifle. At 4.24 meters, it has a spectral peak of ~600 Hz with an A duration of 0.2 millisecond.²¹ Either of these, when situated where there is a reflection of the impulse, will create a second reflected impulse exposure that can be as much as 90% of the initial impulse's energy with similar spectral energy. In an urban terrain such as Baghdad, warfare often takes place in city streets where there is a great deal of reflective surfaces. The spectral peak of the 2 most common combat exposures is below 1 kHz and is another probable variable for the hearing protected acoustic trauma groups hearing postexplosion threshold configuration.

DISCUSSION

Army audiology plays a very important role in preventive medicine and the standard 3 levels of prevention are routinely used. Primary preventive measures include proper selection and use of hearing protection, annual education, and taking a baseline audiogram. Secondary preventive measures involve identification of the early stages of noise induced hearing loss and taking steps to prevent its progression through intervention, follow-up monitoring, and clinical validation of results. If primary and secondary prevention strategies do not work, tertiary services such as hearing aid fitting, aural rehabilitation, and administrative controls are used. The primary and secondary preventive measures of hearing conservation have had a tremendous impact in the reduction of the number of Soldiers with hearing loss over the past 4 decades, but current large scale combat operations have reduced the success rate of conventional hearing conservation in the Army.

Hearing conservation is a robust program in the Army. Unfortunately, hazardous noise and its effects on hearing cannot be eradicated with a one treatment vaccination, it is an ongoing program that requires continuous efforts and leadership support. Army deployments are fluid and the environments to which Soldiers are exposed are constantly changing. For the prevention of hearing loss, this has traditionally posed

a problem because hearing conservation programs were not designed with combat in mind. With asymmetric warfare (coalition forces observing different rules of engagement than insurgents) and a nonlinear battlefield (no frontlines), Soldiers are experiencing more exposure to the sounds of combat. This has forced audiologists to rethink their approach to prevention in these challenging environments.

Even though these cohort case studies were not able to control for the many factors that affect hearing in combat, they do provide a field perspective on hearing protection being used in combat and how it correlates with previous research. This article only addresses hearing thresholds of Soldiers who reported wearing hearing protection when they were exposed to an explosion. It is important to point out that for the many Soldiers were not wearing hearing protection, the hearing loss was substantial and typically involved conductive and sensorineural components. There is also some anecdotal evidence that central hearing loss was a comorbid component of traumatic brain injury. The prevalence of this type of acoustic trauma in Operations Iraq Freedom and Enduring Freedom are not yet known, but are being studied.

The vestibular system may also be damaged by hazardous noise due to its close proximity and similarity in cell structure to the cochlea.²⁸ Soldiers are exposed to explosions, such as improvised explosive devices, mortars, or car bombs. They are also exposed to many steady-state noises such as aircraft, track vehicles, or large electrical generators. These noise sources may cause asymptomatic damage to their vestibular system. Shupak et al did find that symmetric noise-induced hearing loss is correlated with symmetric peripheral vestibular system damage.²⁹ These results were corroborated by M. Hill and D. S. McIlwain (unpublished data, 2006). The reason it is possible to be unaware of a vestibular deficit in conjunction with acoustic trauma is because of the complex relationship between the central nervous system (CNS) of the brain and the 3 primary sensory modalities critical to equilibrium (vestibular, visual, and proprioceptive systems). If an insult to the vestibular system occurs, the CNS relies heavily on information from vision and proprioception to make up for the lack of neural firing from the balance center to compensate. The CNS adapts to the different levels of neural input it receives. During this adaptation time,

the individual often experiences a slight feeling of imbalance, dizziness, or even vertigo, especially in the absence of vision. Symptomatic feelings of imbalance, dizziness, and vertigo typically subside. The vestibular system, combined with the visual and proprioceptive systems, contributes to spatial orientation. It is estimated that 80% of spatial orientation is based on visual cues, but when visual cues are no longer available or are diminished, the vestibular system's role is critically elevated. Situations while flying aircraft or driving an armored personnel carrier, such as white-outs (snow) or brown-outs (sand), may lead to greatly reduced visual cues. If a pilot or driver's vestibular system is damaged, the chance of spatial disorientation occurring in low-vision environments may increase, resulting in a potentially catastrophic accident. It is also possible that this spatial disorientation could be a cause of danger for the ground troops in similar low visibility situations while weighed down with a basic combat load.

CONCLUSION

The solution is on the battlefield. Even if the Soldiers are not directly involved in combat, the common denominator of the small but significant high frequency threshold shift is a combat deployment. Gates and Fallon recommend a more aggressive operational hearing program should be implemented with more Army audiologists deployed to meet the recommended one Army audiologist per 10,000 Soldiers. Currently, there is only one audiologist for over 160,000 deployed Soldiers in Iraq, and none in Afghanistan.³⁰

Increased sensitivity for secondary intervention is also warranted. It is recommended that Soldiers with a small but significant high frequency threshold shift (average positive 10 dB threshold shift at 4 kHz and 6 kHz or a positive threshold shift of 15 dB in either 4 kHz or 6 kHz) postdeployment should receive a follow-up audiogram. Emphasis should be placed on Soldiers avoiding noise of any kind for at least 14 hours with reeducation on what constitutes hazardous noise. If a small but significant high frequency threshold shift is confirmed on the follow-up audiogram, the Soldier should receive at least a verbal acknowledgement that there has been a small change in hearing, interviewed on possible causes, and a more detailed education on the long-term personal and professional consequences of hearing loss. The small

but significant high frequency threshold shift should be viewed as an early indicator of noise induced hearing loss because it places Soldiers at higher risk for clinically significant noise-induced hearing loss.

The Army spends a considerable amount of time and money training an all-volunteer force. In an instant, a Soldier can become a risk for further injury as well as put others at risk due to decreased job performance. Currently, the best solution to the age-old problem of hazardous noise in the Army is the military audiologist. These professionals are indispensable in developing solutions for unique situations such as noise abatement and the selection and use of contemporary hearing protection in combat environments.

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Provider Resilience: The Challenge for Behavioral Health Providers Assigned to Brigade Combat Teams

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INTRODUCTION

Deployment related mental health problems have received increased attention since the Global War on Terrorism began in 2001. In 2003, the Office of The Surgeon General sanctioned Mental Health Advisory Teams (MHAT) to research mental health issues of deployed Warriors serving in Iraq and Afghanistan. The most recent study, entitled MHAT V, found that individuals who were on their third or fourth deployment reported experiencing more mental health symptoms, stress-related work problems and suicide rates were elevated in both theaters of operations.¹ In 2004, Hoge et al, in a study of combat duty in Iraq and Afghanistan, suggested conservatively that as many as 17% of combat veterans could develop mental health disorders such as depression, alcohol misuse, and posttraumatic stress disorder (PTSD) 3 to 4 months after returning from deployment.² The congressionally mandated Department of Defense Task Force on Mental Health examined mental health matters in the armed forces and concluded in 2007 that

The system of care for psychological health that has evolved over recent decades is insufficient to meet the needs of today's forces and their beneficiaries.³

Accounts of the personal struggles to adjusting to life after serving in Operations Iraqi Freedom and/or Enduring Freedom have provided insights into the challenges confronted by many veterans. In a 2007 article, CSM Samuel Rhodes, who spent over 30 months deployed to the middle east, provided an especially poignant description of his experiences with PTSD and concluded his story by encouraging others with similar symptoms to get help like he did.⁴

To address a seemingly growing problem, behavioral health professionals routinely deploy as essential components of combat stress control (CSC)

detachments and combat support hospitals. Lessons learned from these deployments have been well documented. Reger and Moore, psychologists who deployed with the 98th and 85th CSC Detachments respectively, emphasized the need to retain flexibility in allocating assets in theater to maximize the efficient and effective delivery of preventive and treatment services in a combat zone.⁵ In a study of the effectiveness of critical event debriefings conducted in Iraq, Pischke and Hallman, veterans of the 785th Medical Company (CSC) in Iraq, reinforced the need for psychological treatment and identified the benefits of providing mental health services to Warriors on the frontlines.⁶ While CSCs have performed a valuable role in supporting deployed units, those psychologists and social work officers who are assigned to brigade combat teams represent the vanguard of behavioral health resources in today's expeditionary Army. These personnel deploy directly with those who bear the greatest burden fighting this asymmetrical war on terrorism and confront many of the same threats faced by combat arms Warriors. In order to adequately prepare for the demands of duty in a combat zone, behavioral health officers assigned to a brigade combat team must recognize the challenges that await them and develop an action plan to enhance personal resiliency. Neglecting this critical predeployment task can result in a behavioral health provider who becomes less effective over the course of a long deployment, and jeopardizes the quality of care needed to sustain the psychological fitness of our Warriors.

THE STRESS OF BRIGADE BEHAVIORAL HEALTH OPERATIONS

The demand of supporting 2 major combat operations simultaneously has the potential to stretch our forces to the breaking point. Multiple deployments, extended tours, and stop-loss* policies are some of the factors

*Presidential authority under *Title 10 US Code 12305* to suspend laws relating to...separation of any member of the Armed Forces determined essential to the national security of the United States....⁷

that have created an environment that can tax the coping abilities of even well-trained, highly motivated Warriors. Additionally, there are aspects of serving in today's military that compounds an already stressful situation. Advances in technology have created greater access to electronic communications, enabling deployed Soldiers to stay in touch with families back home. While maintaining family relationships may provide much needed emotional support—particularly during a time of crisis—it also means that troops may be exposed to the “mundane stresses” associated with the home front at a time when they can do little to “fix it.”⁸ To help understand the psychological stress inherent in contemporary military operations, Bartone et al developed a model that clearly delineates the primary sources of operational stress.⁹ Initially applied to Soldiers conducting peacekeeping operations in the former Yugoslavia, Bartone later expanded the model and applied it to other contingency operations, including Operations Iraqi Freedom and Enduring Freedom.¹⁰ The primary dimensions of stress identified by Bartone and his colleagues are isolation, ambiguity, powerlessness, boredom, danger, and workload.^{9,10} While all of these elements may produce stress to some extent for all deployed Soldiers, isolation, powerlessness, danger, and workload appear to be those most pertinent to behavioral health operations in a brigade combat team.

Isolation. A sense of “aloneness” can permeate the time spent serving in a foreign land separated from loved ones. The natural feeling of being alone can be magnified for providers who join a unit through the Professional Filler System (PROFIS).^{*} These individuals typically arrive at the unit just prior to deployment and frequently have insufficient time to fully integrate into the unit's culture or to develop meaningful relationships with fellow Soldiers. Having a trusted confidant or battle buddy[†] has long been recognized as an important source of support for coping with the demands of a long combat deployment. Establishing a relationship with a battle

buddy is made more difficult by the fact that behavioral health officers are assigned one per brigade, thus eliminating a coworker as a logical source of peer support. Furthermore, behavioral health providers may be hesitant to confide personally in others as they feel the burden of responsibility of their position in which they are expected to be a source of support for others. Those individuals who are of similar rank (commanders, chaplains, battalion surgeons, other medical personnel) often refer Soldiers for behavioral health assistance. Divulging personal concerns or admitting to experiencing deployment-related stress may damage the professional credibility that is essential to being viewed as a dependable support system for Soldiers. Additionally, the sense of being alone can be intensified due to the constraints placed on conversations with family and friends back home. Discussing the details of working in a war zone with spouses or others via telephone, webcam, or email may be inappropriate and most likely violates operational security.

Powerlessness. In many ways, brigade behavioral health officers occupy a position similar to that of a member of the special staff. Although they possess valuable professional expertise, their capacity for exercising direct power is limited. It is a well known axiom that staff officers make recommendations, commanders make decisions. Thus, it is necessary to get command support for recommendations that affect a Warrior's duty status. For example, a Soldier seeking behavioral health care for acute anxiety or a combat/operational stress reaction may benefit from being placed on alternate duty that does not require him or her to go “outside the wire.” Recommending that the Soldier temporarily “take a knee” while receiving supportive behavioral health intervention could meet resistance from the chain of command because the unit probably needs all of their personnel to complete mission requirements. One's ability to succeed in getting support for treatment and personnel recommendations depends in part on the professional

^{*}PROFIS predesignates qualified Active Duty health professionals serving in Table of Distribution and Allowance[†] units to fill Active Duty and early deploying and forward deployed units of Forces Command, Western Command, and the medical commands outside of the continental United States upon mobilization or upon the execution of a contingency operation.¹¹

[†]Prescribes the organizational structure, personnel and equipment authorizations, and requirements of a military unit to perform a specific mission for which there is no appropriate table of organization and equipment (the document which defines the structure and equipment for a military organization or unit).

[‡]Generally defined as the person to whom a Soldier can turn in time of need, stress, and emotional highs and lows who will not turn the Soldier away, no matter what. This person knows exactly what the Soldier is experiencing because of experience with similar situations or conditions, either current, previous, or both.

credibility that they have established, and not necessarily from power inherent in the position. This is particularly true for junior officers. A general sense of powerlessness also can grow from limitations to alleviate emotional distress caused by psychosocial circumstances. Soldiers who experience “home front” problems with the potential for serious consequences, such as suspected marital infidelity, threats of divorce, or child custody issues, often believe that going home is the only solution to the situation: “The only way I can save my marriage is to get home!” While these claims may be legitimate and elicit empathy and understanding from the provider, rarely do their psychological symptoms warrant medical evacuation from theater. Clinical strategies can be employed to engage the individual in a therapeutic manner, but the person may not be motivated to learn more adaptive coping techniques and remains intent on going home to address the problem. Professionals who are dedicated to helping others may despair over working in an environment that limits their options to effect change and make a positive difference in the lives of Soldiers. As the deployment grinds on, and disappointments mount, it is possible to adopt a hardened, “don’t care” attitude to help manage expectations. This can present an obstacle to developing therapeutic relationships with Soldiers who need help.

Danger. According to the Department of Defense, as reported in the *Army Times* [February 2, 2009], there have been over 4,200 Warriors killed during Operation Iraqi Freedom and 636 who have died supporting Operation Enduring Freedom.¹² This is not to overstate the threat that behavioral health personnel face or to imply that they confront the same level of hostile forces as those who routinely patrol the streets of Baghdad or the mountains of Afghanistan. However, it is worth noting that all deployed Warriors work under a degree of risk that they too could be hit by enemy fire. Indirect fire, such as rocket and mortar attacks, land indiscriminately on forward operating bases. The threat of death or injury is compounded for those providers who extend behavioral health support to the combat outposts and joint security stations that proliferated with the implementation of a counterinsurgency strategy. Improvised explosive devices are a risk for everybody who travels the streets and roads of Iraq or Afghanistan. Additionally, there exists the potential for contracting serious illnesses associated with exposure to contaminants, pollutants,

and other toxic substances. Vehicle accidents such as rollovers occur in theater as well. The threat of becoming a casualty is by no means unique to behavioral health personnel, however, it should be acknowledged as a factor that can impact the conduct of daily operations and can contribute to the erosion of psychological defenses needed to cope in a war zone.

Workload. While the brigade behavioral health team also includes an enlisted mental health specialist, the officer is essentially responsible for supporting approximately 4,000 combat troops. One of the great successes deriving from the attention given to deployment stress is that many brigade combat team commanders now prioritize the establishment of access to behavioral health care whenever it is needed and to whomever needs it. This can significantly strain a 2-person team. The workload oftentimes cannot be shared because there are no other providers available on the forward operating base. The demand for behavioral health services can be driven by multiple factors. Leadership variables, operational tempo, degree of enemy contact, living conditions, and even the effectiveness of support systems for families back home influence the level of stress felt by deployed Soldiers. Regardless of the demand for direct services, the behavioral health provider must remain on-call 24 hours a day, every day, in order to be available for crisis intervention—there is no time off for weekends and holidays. Ensuring access to care becomes more challenging when the unit’s battle space includes numerous combat outposts and joint security stations. Providing outreach to these sites further taxes behavioral health teams simply by enlarging their geographic area of operations. While CSC teams are able to assist in some regions, the primary responsibility for caring for the Warriors securing these sites remains with the organic behavioral health assets.

THE RISK OF COMPASSION FATIGUE

In addition to the amount of work, the nature of the work itself places behavioral health providers at-risk for developing psychological distress that can last far beyond the deployment. Much of the clinical work conducted by behavioral health officers involves establishing therapeutic relationships with the Soldiers they treat. Empathy is the bedrock of this process. The core aspect of empathy is the ability to experience another person’s state of being at any given moment.¹³

When clinicians listen to stories of fear, pain, and suffering, such as those told by Warriors with combat-related trauma, they too may feel similar fear, pain, and suffering.¹⁴ Charles Figley, a pioneer in the field, described compassion fatigue as a natural consequence of working with individuals who experienced distressing events and that being vicariously exposed to the event and responding empathically contributes to developing compassion fatigue symptoms.¹⁵ Irritability, withdrawal, a sense of hopelessness, anger, and lowered frustration tolerance are common psychosocial markers of compassion fatigue and can resemble PTSD.¹⁶

Recent literature clearly demonstrates the relationship between developing compassion fatigue symptoms and working with trauma survivors. Boscarino et al, in a random survey of 236 social workers living in New York City, discovered that those who had worked with survivors of the terrorist attack on the World Trade Center were more likely to develop secondary trauma.¹⁷ The authors further suggested that the degree of exposure, personal history, availability of social support, and environmental factors were variables that influenced the development of symptoms. In describing the Israeli experience, Fraidlin and Rabin discussed the harrowing ordeal of social workers who work with terrorist victims, and concluded that "repeated incidents are capable of producing severe reactions similar to those experienced by the casualties themselves."¹⁸ Similarly, in a case study, Tyson connected the provision of trauma therapy by clinical social workers in the Veteran's Administration Vet Centers (outpatient clinics) and compassion fatigue.¹⁹ She urged the mental health field to respond to the needs of therapists by developing interventions and educational programs to support those who work with trauma survivors. In 2007, Bride's study of 300 social workers found that 5% met the diagnostic criteria for PTSD, twice that of the general population.²⁰ The data also revealed an astounding 55% met at least one diagnostic criterion for the disorder. Bride suggested that the high rate of secondary trauma among clinical social workers could eventually lead many to leave the profession.

The risk for developing compassion fatigue is not confined to those who provide behavioral health care. Kenny and Hull, in a study of the experiences of critical care nurses caring for war casualties, found increased stress levels that resulted in symptoms

consistent with secondary trauma.²¹ The authors, themselves active-duty Army nurses, attributed workload factors, empathic responses to the suffering of young wounded Warriors and their Families, as well as distress over the inability to alleviate pain as major factors in the compassion fatigue responses of nursing personnel. The "hidden cost of caring" presents challenges for health care managers as they must establish organizations that provide supportive environments for those who work with trauma victims in order to retain personnel and to sustain a high quality of care.²²

In light of what is known about compassion fatigue or secondary trauma, it is clear that behavioral health providers deployed with a brigade combat team are at an increased risk for developing psychosocial distress. An effective behavioral health program includes proactive traumatic event management measures. This potentially places the behavioral health team in every bad situation experienced by the brigade. Responding to the aftermath of combat actions or the loss of a fellow Soldier due to suicide or an accident exposes the team to the emotions evoked by such incidents. Another potentially emotional event is the memorial service that follows the death of a Warrior. Deciding to attend memorial services is ultimately a personal decision that each behavioral health officer must make. However, from a professional standpoint, there is value to having a visible presence at the service as it demonstrates a desire to be a source of support for the unit while expressing respect for the fallen Warrior, as well as those left behind who must continue the mission. As casualty rates decline, as is hoped by all, Bartone and his colleagues' concepts of ambiguity and boredom⁹ may rise to the forefront as sources of stress for brigade behavioral health teams. Until that day arrives, workload and the concomitant risk of compassion fatigue will continue to pose the greatest threat to the psychological well-being of the provider, and could degrade the quality of care provided to our Warriors.

RESILIENCY SUPPORT PLAN

Resilience is characterized as the capacity "to maintain relatively stable, healthy levels of psychological and physical functioning" when exposed to highly disruptive circumstances.²³ Resiliency in the face of potentially overwhelming challenges can be bolstered by actions taken by both the organization and the

Provider Resilience: The Challenge for Behavioral Health Providers Assigned to Brigade Combat Teams

individual. Structural solutions may hold the most promise to reducing the potential impact of immediate symptoms on workers exposed to trauma.²⁴ Thus, the organization can create an environment that promotes resiliency through the use of combat stress doctrine, personnel policies, and training initiatives that are consistent with supporting a modular force. We recommend:

- Increase behavioral health authorizations in the brigade combat team. A 2-person team is inadequate to support a brigade combat team (BCT) with several thousand personnel. The task becomes even more daunting when the unit is dispersed across a broad front. Adding another behavioral health officer or mental health specialist, if not another complete team, would be prudent given the Army's reliance on BCTs to support present and future contingency operations.
- Clarify the role of the behavioral health officer as a brigade asset. While the behavioral health team is assigned to the medical company, brigade support battalion, the team should be clearly recognized as a brigade asset in ways that other medical specialties assigned to the level II medical support unit are not. The behavioral health officer should have the latitude to design and implement a behavioral health program that supports the maneuver units without the encumbrances of overly-involved medical company and brigade support battalion commanders. Perhaps the best fit is to realign the behavioral health team within the brigade's headquarters company. This move would better position the behavioral health officer to interact directly with the brigade commander and staff to incorporate behavioral health concepts into operations in coordination with the brigade surgeon.
- Emphasize that CSC detachments provide direct support to BCTs. Independent CSC teams operating in a BCT area of operations creates confusion and inefficiencies in the delivery of scarce behavioral health resources. Combat stress detachments should position their assets to directly support the BCTs operating in their battle space. To ensure this occurs, combat stress teams should be attached to, or, at a minimum, be operationally controlled by the supported BCT. Brigade surgeons need to be able to directly influence the CSC assets supporting the brigade in order to

create a coordinated behavioral health support plan with clear lines of responsibility.

- Reduce the dependence on PROFIS providers. Filling behavioral science officer authorizations organic to BCTs should be the highest priority for assigning behavioral health providers. If personnel shortages dictate that some BCT positions require PROFIS support, then field grade officers should be slotted into these positions since their experience should make them better equipped to effectively adapt to the demands of a deployment.
- Combat/operational stress control (COSC) training. In December 2008, The Army Surgeon General mandated that all behavioral health care providers will, prior to deployment, attend the COSC course conducted by the Army Medical Department Center and School. The course curriculum reflects current lessons learned in Iraq and Afghanistan. Commanders at all levels should support this initiative by ensuring that their behavioral health teams attend the course as an essential part of predeployment training.
- Army Provider Resiliency Training Program (PRT). The Army's PRT program was implemented in 2008 to help reduce provider fatigue and burnout. Commanders have a responsibility to their health care personnel to fully support this important program and individual providers must take advantage of the potential benefits it has to offer.

In addition to systemic support, individuals can take steps to fortify themselves against the rigors of combat. While a self-care plan is necessarily a personal matter, the following components should be considered:

- Establish a sense of mastery in the job. Professional development through experience and training is essential to gaining confidence in one's ability to perform under the most difficult conditions. Young officers can benefit greatly from a mentoring relationship with a trusted, more experienced senior officer. Taking responsibility for one's career development will help prepare young professionals to confidently conduct the full range of behavioral health operations when deployed.
- Maintain a social support network. Healthy relationships are vital to a person's psychological well-being and emotional stability. Find a good

battle buddy and be one in return. All deployed Soldiers should use the vast array of available communication tools, including old fashioned letter writing, to stay connected with family and friends back home. However, this should be done with the awareness that too much information flowing in and out of theater can be counterproductive.

- Nurture spiritual health. Frequent exposure to pain and suffering can dim one's inner spirit. Make time, at least once a week, to engage in an activity, such as attending religious services, meditating, or performing Tai Chi exercises, for example, that replenishes the spirit.
- Conduct aerobic activities. It is important to be physically fit prior to deployment. Although the opportunity to participate in physical exercise during a deployment will be determined by operational factors, it is essential that individuals find a way to strengthen the body through aerobic activities, preferably 3 times a week. Most forward operating bases now have at least one gym supplied with exercise equipment, and some larger bases can accommodate running, assuming the threat level allows it.
- Maintain physical nourishment and sleep discipline. Eating 2 to 3 meals daily, staying hydrated, and getting 7 to 8 hours of sleep a day are basic tenets of most stress management programs. However, during deployments, these simple tasks become much more difficult to achieve just as they become more critical to the maintenance of effective functioning. Proper hydration is especially crucial while conducting operations in an arid climate. Getting sufficient restorative sleep may be challenging due to the demands of irregular work hours, convoy schedules, and being awakened to respond to emergencies at night. Nevertheless, a regular sleep schedule should be followed as much as possible.
- Finding a meaningful purpose in life. A commitment to fulfill a meaningful purpose in life can provide motivation, direction, and the peace that comes from a sense of leading a satisfying life. The path one chooses towards serving a greater good, whether it is service to one's country, to relieve suffering, or freeing the oppressed, is

rooted in personal values and beliefs. Operationalizing the pursuit of one's purpose extends far beyond simply keeping a good attitude during trying times. Personal sustenance can come from keeping faith with those higher ideals that inspire us to serve others when circumstances are at their bleakest. As Victor Frankl quoted Nietzsche in his classic work, *Man's Search for Meaning*,²⁵

He who has a *why* to live for
can bear any *how*.

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Provider Resilience: The Challenge for Behavioral Health Providers Assigned to Brigade Combat Teams

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The Unit Field Sanitation Team: A Square Peg in a Round Hole

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ABSTRACT

Basic field sanitation and hygiene is a lost art in today's modern Army. Today, more than ever, there is a need for the unit field sanitation team (FST) to serve as advisors to unit commanders in the area of basic field sanitation and hygiene. Soldiers should know how to construct field latrines, construct waste disposal devices, conduct pest management and control activities, disinfect field water supplies, and practice personal hygiene under field conditions. The current unit FST concept is centered on company-sized formations operating in open terrain. This concept does not support current operations, transformed formations, rapidly changing doctrine, and the expeditionary nature of the Army. This article does not present a new concept, but rather a new look at an existing concept and practice based upon the lessons-learned and after-action reports from the Global War on Terrorism to support the Army in transformation during an era of persistent conflict.

BACKGROUND: THE SQUARE PEG

Historically, in every conflict in which the US has been involved, only 20% of all hospital admissions have been from combat injuries. The other 80% have been from disease and nonbattle injury (DNBI).¹ Excluded from these figures are large numbers of service members with decreased combat effectiveness due to DNBI not serious enough for hospital admission. During World War II, it became apparent that more action was needed at the unit level to counter the medical threat. To answer this need, the unit FST concept was developed. Selected members from each company-sized unit received special training in DNBI prevention so they could advise the commander in preventive medicine measures. This training enabled the unit commander to provide arthropod control, individual and unit disinfection of water, and safe food supplies. These measures resulted in reduced DNBI losses. Just as it was conceived over 60 years ago, the unit FST continues today to be a critical front line defense against medical threats.

AN ERA OF PERSISTENT CONFLICT: THE ROUND HOLE

The medical threat to field forces can be seen today in operations where individual preventive medicine measures are lacking and poor field hygiene and sanitation exist. Indeed, the expeditionary nature of our forces today and the Global War on Terrorism are repeatedly placing US forces in locations where

significant, serious medical threats from infectious diseases are commonly present. The number of DNBI continues to reduce the effective strength of units and minimize combat power. In some cases, Soldiers are medically evacuated from theater due to preventable diseases, such as leishmaniasis and malaria. In other cases, training exercises almost grind to a halt due to diarrheal illnesses.

However, usually these medical threats can be easily countered by the implementation of basic field hygiene and sanitation practices and individual preventive medicine measures. Preventive medicine measures are simple, common sense actions that any service member can perform and every leader must know. The application of preventive medicine measures can significantly reduce time lost due to DNBI.

Both today's fight and future engagements will require our formations to operate as small teams, perhaps no larger than squad- or platoon-sized elements geographically dispersed throughout an area of operation. The area of operation will most likely be in urban or developed areas with limited resources available, and characterized by long, unsecure supply lines. These conditions add to the difficulties of implementing and sustaining the unit FST using existing doctrine and tactics, techniques, and procedures. Therefore, how do we adapt the unit FST concept to meet the needs of today's fight, as well as future engagements? We modify the peg.

PUTTING A SQUARE PEG IN A ROUND HOLE

The objective is to develop a sustainable program that emphasizes the need for field hygiene and sanitation in the field. This is particularly important in an age where a majority of our Soldiers come from urban areas and not accustomed to austere conditions expected in the expeditionary nature of our current and future formations. This can be done by modifying the current unit FST concept by changing current doctrine, organization, training, materiel, leadership, education, personnel, and facilities to retool the square peg to meet current and future operational needs.

Doctrine

Current doctrine states that there will be one unit FST for each company-sized element. Under previous force constructs and Cold War doctrine, this was a good concept; however, it does not fit today's fluid environment and focus on small-unit, full-spectrum operations. The doctrinal allocation of one unit FST per company should change to one unit FST per platoon-sized element, at a minimum. This change would enable the unit FST to operate at a lower level and be able to support numerous small combat outposts in an area of operation. Most of the current concepts would still be applicable, only pushed down one level to the platoon, rather than the company. Doctrine must then also be updated to keep pace with new and emerging technologies for waste disposal, water reuse, personal hygiene, personal protective equipment and measures, and disease prevention tactics, techniques, and procedures.

Organization

The documentation of unit FST training as an additional skill identifier (ASI) and inclusion of that specialty in the table of organization and equipment* (TOE) of all platoon-sized units should be considered. This will require creation of the ASI and the procedures to document it in the individual's personnel file. Individual Soldiers trained in a more intensive unit FST training program would receive the ASI, which would then be documented on an individual's personnel record to reduce the time and money involved in repeatedly training individuals. In addition, the documentation of the ASI on the TOE will allow units to have individuals identified as unit FST members, which can be reported on the Unit Status

Report (USR). This not only formalizes the unit FST concept, but holds commander's accountable for the implementation of the program. Just as individuals are identified as a "driver" (an additional duty) on the TOE, members of the unit FST can be identified as such. This would codify the existence of the unit FST on the TOE and be used to ensure that Soldiers are trained in this position by receipt of the ASI. This process would also enable the tracking of these items on the USR, resulting in visibility at all command levels.

Training

The planning and contracting of field hygiene and sanitation devices can be integrated into training programs. This would allow unit commanders and staff to plan for and implement the use of these facilities in accordance with Army guidelines, ensuring that they are knowledgeable on the number and size of the facilities required to accommodate their unit and mission. Several lessons learned from operations in Afghanistan and Iraq showed that individual units were able to construct field hygiene and sanitation devices for themselves but encountered problems when their population grew or their mission changed. Now units are isolated away from their respective battalions or brigades making the unit rely on itself more than ever. Proper education and training of leaders in the sizing, use, and limitations of field sanitation and hygiene devices can alleviate these problems. Commanders and staff will be educated on when to sequence and construct additional facilities to accommodate population surges and mission changes. More importantly, training should focus on the integration of planning for field hygiene and sanitation devices prior to entering a theater to determine which methods are most suited for the operation and what materials are readily available. It does no good to plan for the use of portable toilets when there are no means to procure them in theater.

Materiel

The equipment required for personal protective measures and to conduct basic unit FST missions already exist in the inventory. What changes is how this equipment is allocated to unit FST members, the unit, and the individual Soldier. Many of the items found in Appendix C of *Army Field Manual 4-25.12*² are common tables of allowance[†] (CTA-50-900, -909, -970) items which could be issued directly to the individual Soldier, rather than procured by the unit

*Defines the structure and equipment for a military organization or unit.

first, then issued to the Soldier. Avoiding the middle man in this case reduces the burden on the unit in the purchase of these expendable supplies. Other items could be packaged into an equipment set to allow for property book accountability and routinely checked as part of the unit's command supply discipline program. Technology continues to advance and so do innovative methods for waste disposal, water reuse, personal hygiene, and personal protective equipment.

Leadership and Education

The primary phase to this concept is the integration of unit FST training and emphasis of its importance into all education systems, beginning with initial entry training. The unit FST concept and tasks would be part of initial entry training for all Soldier and officer (officer candidate school, reserve officer training course, US Military Academy) accessions. Soldiers would receive additional training in advance individual training courses, then again throughout the noncommissioned officer education system. Likewise, officers would receive training in all officer education systems courses throughout their career. This repetitive training is designed to emphasize the basic fundamentals of field sanitation and hygiene, and regain the "lost art" of those disciplines. Field hygiene and sanitation information should be integrated into all leadership and education programs across the Army, not solely in the Army Medical Department (AMEDD). These are knowledge and skills that are required for force health protection and the reduction of DNBI. Emphasis of this training throughout the individual's career is vital to the success of the program and the conservation of our Army's fighting strength.

Personnel and Facilities

Assignment of an ASI to personnel trained in unit FST principles does not require additional personnel. The current force structure can be used. Likewise, additional facilities are not required to implement this program. Most training areas already have locations that have standing dig permits to allow training on the construction of hasty fighting positions and deliberate fighting positions. We just need to encourage the use of these existing facilities to train in the basic concepts of unit FST.

†An equipment allowance document that prescribes basic allowances of individual or organizational equipment, and provides the control to develop, revise, or change equipment authorization inventory data.

CONCLUSION

As with the existing unit FST program, the most significant barrier to the incorporation of an "enhanced" FST concept is command emphasis. Without command emphasis, the program will continue to be less than successful in the prevention of DNBI casualties. As with any new concept or change from the status quo and the way the Army has done things in the past, there will be resistance to change. Overcoming the reluctance to change will be a major challenge. Implementation of these changes and transformation of the unit FST require a coordinated effort by many organizations and cannot viewed as a constraint or placed in the "too hard to do" box.

The unit FST program requires command emphasis in order to be effective. The unit FST program is not solely an AMEDD responsibility, but rather an Army program critical to the conservation of fighting strength through the reduction of preventable DNBI. To be effective in meeting the expeditionary nature of our Army in an era of persistent conflict, the implementation and execution of the unit FST program requires a new look at an old concept. The evaluation of the current unit FST concept using the doctrine, organization, training, materiel, leadership, education, personnel, and facilities approach presented in this paper will hopefully encourage discussion to transform the unit FST to meet current and future operational needs.

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Prisoner of War Camps: Lack of a Revolution

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DISCLAIMER

The definition and use of the term prisoner of war or enemy prisoner of war after 1949 are specifically outlined in the Geneva Conventions of 1949, Convention (III) Relative to the Treatment of Prisoners of War¹:

Art 4. A. Prisoners of war, in the sense of the present Convention, are persons belonging to one of the following categories, who have fallen into the power of the enemy:

(1) Members of the armed forces of a Party to the conflict, as well as members of militias or volunteer corps forming part of such armed forces.

(2) Members of other militias and members of other volunteer corps, including those of organized resistance movements, belonging to a Party to the conflict and operating in or outside their own territory, even if this territory is occupied, provided that such militias or volunteer corps, including such organized resistance movements, fulfill the following conditions:

(a) that of being commanded by a person responsible for his subordinates;

(b) that of having a fixed distinctive sign recognizable at a distance;

(c) that of carrying arms openly;

(d) that of conducting their operations in accordance with the laws and customs of war.

(3) Members of regular armed forces who profess allegiance to a government or an authority not recognized by the Detaining Power.

(4) Persons who accompany the armed forces without actually being members thereof, such as civilian members of military aircraft crews, war correspondents, supply contractors, members of labour units or of services responsible for the welfare of the armed forces, provided that they have received authorization, from the armed forces which they accompany, who shall provide them for that purpose with an identity card similar to the annexed model.

(5) Members of crews, including masters, pilots and apprentices, of the merchant marine and the crews of civil aircraft of the Parties to the conflict, who do not benefit by more favourable treatment under any other provisions of international law.

(6) Inhabitants of a non-occupied territory, who on the approach of the enemy spontaneously take up arms to resist the invading forces, without having had time to form themselves into regular armed units, provided they carry arms openly and respect the laws and customs of war.

Terrorists do not meet the requirements above and are thus referred to as “unlawful enemy combatants/detainees.” Those captured in Iraq after the official cessation of war are referred to as “civilian internees/detainees.”

Throughout the history of modern warfare, accounts of prison atrocities have repeatedly surfaced which depict active and passive aggression towards prisoners of war (POWs). Yet, with each conflict, new accounts are born and an undeniable reality of warfare inflicts fresh scars for aggressors to bear. It is understandable, based on human nature and the goals of war that a government (or its representatives) will feel malice toward enemy prisoners captured during a conflict. It is unquestionably a challenge to overcome that human nature, despite the statutes which outline lawful

treatment of POWs.² While most aspects of warfare have been revolutionized throughout history, the means by which a military deals with its POWs remains somewhat mired in the reluctance of leaders to acknowledge that it will factor such into every conflict. The management of POWs will, in fact, become a source of controversy as long as it is handled as an afterthought. As evidenced throughout history, this article presents examples, dating back to the Revolutionary War, of how law can only influence human nature to a point, especially when resources are

limited, secrecy is paramount, ignorance is a reality, and accountability is questionable.

During the American Revolutionary War, it was obvious the British failed to plan for handling thousands of POWs on foreign soil. With limited facilities in New York City and funds not available to build, the British decided to convert a dozen or so unseaworthy Royal Navy ships harbored in the area into POW facilities.³ The most infamous of these was the *HMS Jersey*, a former British hospital ship in Wallabout Bay near Brooklyn, New York. The ship was originally built as a destroyer in 1736, but was converted by removing the masts and nailing up the gun ports.⁴ The *Jersey* was decrepit and conditions harsh, with overcrowding an immediate and ongoing problem. Normally, the *HMS Jersey* was manned by a crew of about 350 sailors, yet as a prison ship it housed over a thousand POWs.³ Overcrowding only worsened as the war progressed, due in large part to issues with prisoner exchange (the British captured thousands of prisoners and George Washington did not favor exchanging veteran British Soldiers for sick, untrained Americans who were often Privateers).⁵

The Department of Defense currently lists 4,435 US battle deaths during the Revolutionary War. Another 20,000 died in captivity from disease or for other reasons.⁵ Historians estimate the total number of prison ship deaths between 8,000 and 11,644.^{6,7} An estimated 4 of every 5 prisoners on the *HMS Jersey* died and as many as 8 corpses a day were "buried in Wallabout Bay."⁷ The atrocious sanitary conditions were ultimately responsible for a great majority of the deaths: communal buckets for defecating resulted in widespread dysentery and cholera; thousands of men crammed below decks without light or fresh air aided transmission of diseases such as tuberculosis, smallpox, and yellow fever; and lack of fruit and vegetables guaranteed scurvy among many prisoners. What sparse food was provided to the prisoners was normally maggot-infested, moldy, or simply rotten beyond consumption. The political situation only worsened the prisoners' fate as British tensions led to increased mistreatment. With no threat of retribution, guards imposed inhumane and degrading treatment on prisoners, often leading to injury and/or accidental death.⁶ The Revolutionary War provided firsthand experience for American Soldiers and leaders on the ramifications of poor planning and mismanagement of prisoners captured in combat. However, Americans would repeat the mistakes of the British. In less than

100 years 2 Civil War POW camps would enter the realm of infamy.

Andersonville, the infamous POW camp established by the Confederacy in a small village of the same name in Sumter County, Georgia, was one of the largest Confederate military prisons established during the Civil War.⁸ Although originally established to move prisoners from the Richmond area to a more secure location where food was abundant, the 26.5 acre stockade with its minimal staffing could not adequately support the more than 45,000 Union Soldiers confined inside its walls.⁹ Originally built to house only 10,000, it was obvious why conditions at Andersonville are described as worse than any other prison camp, north or south.¹⁰ Severe overcrowding, lack of shelter, diminishing resources, and the inevitable contamination of the stream providing the only water to the camp led to a 30% mortality rate.¹⁰ By the end of Andersonville's 14-month life, nearly 13,000 men were dead from malnutrition and the diseases associated with the deplorable conditions.¹¹ As the former prison grounds appear now, one would find it difficult to imagine the conditions and challenges of running the camp in 1864, however, the history of Andersonville tells the story of an army unprepared for vast numbers of prisoners, a lack of understanding or guidance of how to take care of them, and an unfortunate officer, CPT Henry Wirz, who "wore the blood of all prisoners on his hands."¹¹

CPT Wirz was not the first officer to take charge of the Andersonville prison, nor was he solely responsible for the lack of funds, resources, or personnel to run the facility. However, when people in the north learned of the horrors there, he became the most convenient target. Although testimony from his trial indicates that CPT Wirz did make an effort to improve conditions after his arrival at Andersonville, the reality was that prisoners were dying every day (one every 11 minutes on one particularly bad day) of typhoid, gangrenous infection, and communicable disease.¹² To make matters worse, the War Department stopped the prisoner exchange program, further stressing local families and contributing to the demand for vengeance. Since there was no plan for how to handle the situation at Andersonville or northern prison camps, creating a spectacle out of the Wirz trial deflected attention away from the north and the US government. Ironically, CPT Wirz's trial and subsequent hanging appeased the population which had been so appalled by the conditions at Andersonville—conditions which were

Prisoner of War Camps: Lack of a Revolution

in part a result of the War Department's termination of the exchange program.¹¹ There were, in fact, plenty of reasons for the government's attempts to deflect attention away from the Union prison camps, which harbored their share of squalor and death.

Conditions at the Union POW facilities at Camp Douglas in Chicago and the lesser known prison at Elmira, NY, (frequently referred to as "Helmira") rivaled those at Andersonville, although history less willingly tells their story, and no Union commander would ever die for the atrocities committed there.¹³ The Union Army did no better than the Confederates in handling the challenge of managing POWs when, in early 1862, Camp Douglas was hastily converted from a training camp into a POW camp, eventually earning the title, "eighty acres of hell."¹⁴ Although the prisoner population at the camp never rivaled the 45,000 housed at Andersonville, Camp Douglas was known as the northern prison camp with the highest mortality rate of all Union Civil War prisons, equaling and sometimes exceeding the highest death rates at Andersonville.¹³

The hasty placement of a POW camp in Chicago was a tactical error on the part of the Union Army, considering the city was filled with spies and southern sympathizers who made efforts to arm the prisoners. Initially, the location may not have seemed ill conceived as the city residents regularly visited Camp Douglas to gawk at the Confederate prisoners, and an observation platform was even constructed to aid the citizens' viewing.¹³ Conditions inside the camp were so deplorable that Henry Whitney Bellows, president of the US Sanitary Commission, wrote to Colonel Hoffman, his superior, after visiting the camp:

Sir, the amount of standing water, unpoliced grounds, of foul sinks, of unventilated and crowded barracks, of general disorder, or soil reeking miasmatic accretions, of rotten bones and emptying of camp kettles, is enough to drive a sanitarian to despair. I hope no thought will be entertained of mending matters. The absolute abandonment of the spot seems to be the only judicious course. I do not believe that any amount of drainage would purge that soil loaded with accumulated filth or those barracks fetid with two stories of vermin and animal exhalations. Nothing but fire can cleanse them.¹⁵

Inside the prison, multiple methods of torture, such as reduced food rations, prisoner executions, isolation in the "white oak" dungeon, hanging by thumbs, or being

forced to ride on Morgan's wooden mule (with weight hung on their feet to make it more painful) were regularly utilized to keep the prisoner population down, to maintain order, and to extract information.^{13,15} In 1863, 75 prisoners made a timely escape and managed to avoid the fate of over 11,000 prisoners who died the following year. Camp Douglas was closed in 1865 when the remaining prisoners were asked to take a loyalty oath to the US and then set free.¹¹ Despite fewer pages in the history books, the Union prison camps are nonetheless evidence that during the Civil War, neither side was prepared to handle POWs and neither figured out how to successfully remedy the situation once it presented itself. Repeating the same mistakes as others, from the atrocious depravities to establishing inadequate facilities, Americans had failed miserably at their first test as guardians of POWs.

In 1899, the term "prisoner of war" was originated at the Hague Conference, which set forth the basic principles governing the definition of a POW and the treatment afforded them.¹⁶ The Hague Conferences of 1899 and 1907, and the subsequent Geneva Conventions of 1929, established ground-rules for managing POWs, but there was no guarantee that every country would follow them. While it is not unreasonable for a nation to expect fair treatment of its Soldiers if they are taken prisoner by the enemy, the expectation is flawed because it presupposes that the enemy can understand the principle of surrender. As was observed in World War II, this is not always the case. While there are many examples of mistreatment of POWs by our enemies (ie, the Germans at Berga and the Japanese at Cabanatuan), few examples compare to conditions at Camp O'Donnell, the transient camp in the Philippines situated at the end of the Bataan Death March route.

Camp O'Donnell has been referred to as "Andersonville Revisited" for good reason.¹⁷ Despite the passage of 80 years and multiple documents outlining acceptable treatment of POWs, many of the Filipino and American prisoners held at Camp O'Donnell faced the same horrors of those interned at Andersonville. One difference between the situations was that during the Civil War, ignorance, lack of resources, and malice were often the reasons for the conditions, while at Camp O'Donnell, the primary issue behind the maltreatment of prisoners was the

inability of the Japanese to understand or accept that honorable men were capable of surrender. To the Japanese, the troops who survived the Bataan Death March to reach Camp O'Donnell were not POWs, they were nothing.¹⁸

Camp O'Donnell was originally a Filipino Constabulary Post, partially constructed and with little infrastructure. Like Andersonville, Camp O'Donnell contained only one water spigot for approximately 50,000 prisoners and it was not unusual for a prisoner to die in line after waiting all day and night for his turn.¹⁸ In the first 2 months at Camp O'Donnell, more than 1,500 American and 20,000 Filipino Soldiers died, an average of 358 per day.¹⁹ The sanitary conditions in the camp were so deplorable that the meager servings of rice received by the prisoners were inevitably consumed while covered with blue and green bottle flies.¹⁸ Gravedigger detail was a common requirement for prisoners strong enough to dig, and dig they did, sometimes burying 400 bodies a day. The graves were large shallow holes, which were dug up by dogs each night creating festering pools of disease. There was, surprisingly, a hospital at Camp O'Donnell, although among the prisoners it was basically considered a place where one went to die. It is difficult to fathom that a group of civilized people could allow and even condone the conditions at Camp O'Donnell, but the Japanese government had not signed nor approved of the Geneva Convention, and therefore did not believe American and Filipino prisoners were entitled to any safeguards.¹⁸ Ultimately, even the Japanese recognized the potential backlash resulting from Camp O'Donnell and moved the prisoners to Cabanatuan in June 1942, where many more would die before the Rangers executed a successful raid on the camp. Unfortunately, POW camps in WWII would not be the last time in the 20th century that the Geneva Conventions were ignored and an enemy significantly misunderstood.

During the Korean War, a lack of planning for and management of Korean and Chinese POWs taken by US and United Nations (UN) forces was an unsurprising shortfall in the disjointed and limited preparation for that conflict. While food, clothing, and housing were listed as adequate by the International Red Cross, the large number of captives, at one time over 80,000, made close supervision difficult.²⁰ Maintaining good order was nearly impossible, with

bloody clashes a common event inside the camps. UN POWs held by North Koreans and the Chinese, however, did not fare as well. It is alleged that North Korean forces subjected UN POWs to forced labor, beatings, starvation, and summary executions/massacres such as those at Hills 312 and 303.²¹ American POWs were further subjected to physical abuse and torture at the hands of the Chinese. US Army POWs died in large numbers during the first part of the war with a mortality rate of 40% while confined, generally due to unchecked diseases, untended wounds, malnutrition, and extreme cold.²⁰ Alarmed at the extremely high death rate, the Chinese eventually started to improve conditions at POW camps and supplied food and medicine.²⁰

Unlike Korea, in Vietnam there was plenty of time prior to major hostilities when both sides could have planned for the inevitable POW situation that would arise. In the case of the North Vietnamese, it was not a lack of planning, rather a pure disdain for the enemy and disregard for the provisions of the Geneva Convention which were updated in 1949. In a show of somewhat poetic justice, the Hoa Lo, a prison built by the French to hold Vietnamese prisoners captured fighting for their independence from French Indochina, was used by the North Vietnamese to imprison Soldiers, Department of State personnel, and supporters of the US effort. The Hoa Lo became one of the most famous POW camps in history, heretofore known as the "Hanoi Hilton."²²

As is the case with the majority of the POW camps immortalized in historical records, the conditions at the Hanoi Hilton were deplorable. Not only were more than 300 prisoners subjected to miserable sanitary conditions and regular bouts of tropical disease, there is significant evidence that the prisoners at the Hanoi Hilton were systematically abused, both physically and psychologically. This is seemingly a fact, although the Vietnamese government still denies it and the US government failed to ever take any action on it. None of the Vietnamese officials implicated in the abuse have ever been formally charged by the US or its allies nor has extradition ever been demanded.²³ The information regarding abuse was first revealed in the late 1960s when release of prisoners began, but was not made available to the general public for fear that retaliation would be inflicted on those still in captivity. It is widely known by the American public and much

Prisoner of War Camps: Lack of a Revolution

of the world that American prisoners were tortured in North Vietnamese prison camps, however, the fact that little if any action was taken or even threatened against the government responsible for that torture left the status of POWs in future wars potentially uncertain.

After the shock of September 11, 2001, the US government vowed that the victims of that day did not die in vain. Over the next 18 months, 2 very different fights were initiated in Afghanistan and Iraq as part of the Global War on Terrorism (GWOT). While many problems in the GWOT have been excruciatingly dissected by armchair quarterbacks around the globe, there is no argument with the fact that the incidents which took place at the Bagram and Abu Ghraib prison facilities (although realistically not comparable to stories of prison camps past) put an indelible black mark on US efforts in both countries, and that a lack of planning for handling prisoners of war was in part responsible.

In Afghanistan, it was obvious from the beginning of the conflict that US military leaders failed to appropriately plan for housing detainees (unlawful enemy combatants) as the selected Bagram Theater Internment Facility (BTIF) was not an ideal location. Originally built by the Soviets in the 1980s as an aircraft machine shop, the facility was retrofitted with wire cages and wooden segregation cells (later upgraded to concrete segregation rooms with latrine and sink).²⁴ Initially intended to serve as a temporary facility, the BTIF has now housed detainees longer than Guantanamo Bay.²⁵ In the early days of the conflict, conditions inside the BTIF mirrored those of US Soldiers (except for the wire cages) to include burn out latrines and makeshift wooden flooring.²⁵ Over the next several years, numerous upgrades and expansion projects ensued. Nevertheless, even today, guard force personnel remain extremely limited in the number and quality of improvements they can make due to the physical location of the facility and land space allocation. With limited planning, little to no formal training in handling detainees or managing detainee camps, shortfalls in military reference material, and the issuing of confusing, often conflicting, higher headquarters' guidance, it did not take long for allegations of abuse, torture, and maltreatment to surface, even though most were unsubstantiated. One such event involved the deaths of 2 Afghan detainees in December 2002, while in the custody of US forces

at the BTIF. Allegations of beatings, blunt force trauma, and degrading treatment, as well as the alleged cover-up of the circumstances surrounding their deaths quickly reached several news outlets. The US Criminal Investigation Command initiated an investigation and in October 2004, determined there was probable cause to charge 27 Soldiers with criminal offenses.²⁶ During this investigation it was also discovered that some of these indicted Soldiers had deployed and helped establish the interrogation and debriefing center in Abu Ghraib, Iraq.²⁶

In late 2002, LTG Richard Cody directed a bottom-up review of the Military Police Corps (MPC) structure; largely as a means of making it better suited to handle the internment/resettlement (I/R) mission, and potentially as a result of the incident at the BTIF.²⁷ This indicates the likelihood that someone, somewhere recognized the potential for a POW situation to develop in the pending war in Iraq, and the need for a means of dealing with it. Unfortunately, that foresight did not change the fact that, although significantly limited at the time, the existing I/R assets of the Military Police Corps may have had a positive impact on the detainee situation in Iraq and could have lessened the likelihood of a detainee-related scandal had they been deployed. Instead, the potential for a significant POW situation was underestimated, the power of human nature was once again denied or at best misunderstood, and military policemen and women whose fellow Soldiers were simultaneously threatened on the streets around Baghdad daily were expected to deny their instinctive desire for vengeance and guard enemy prisoners without incident. Not only was this a task they were not properly trained to execute, but also a task that their nonhabitual higher chain of command was not trained to supervise. While we do not by any means condone the actions of the Soldiers involved, it was likely inevitable that a scandal of this nature would occur, considering the circumstances and the power of human nature.

The Baghdad Central Confinement Facility (BCCF) was established at the Abu Ghraib prison compound, 32 km west of Baghdad. Internationally known as Saddam's "torture house," the facility was used by the Ba'ath government to torture and execute presumed dissidents.²⁸ It was renamed BCCF after US forces expelled the former Iraqi government. The decision to use this facility as a POW (detainee) camp, already

tainted internationally due to the thousands executed by the Saddam regime, was presumably a tactical error. Difficult to resupply due to its close proximity to Fallujah and major combat operations early in the war, Abu Ghraib also stood among heaps of trash and, allegedly, the bones of previous occupants. Soldiers were housed in former prison structures, complete with torture hooks and the ghosts of the past. Ironically, in close proximity to the hard site (now infamous as the site where US forces abused detainees), several tent camps were constructed to hold the ever-increasing number of detainees, a necessary action reminiscent of conflicts past. A number of factors contributed to the overall situation and mindset of both guards and prisoners: harsh environmental conditions, lack of adequate infrastructure to provide basic sanitation and hygiene conveniences, and a shortage of overhead protection from combat operations within these tent camps. These were problems that only exacerbated the challenges at Abu Ghraib. In addition, the sheer craftiness of detainees to continually circumvent and negate any attempt by the guard force to improve conditions for them set the stage for a battle of human will and nature.

A window into this darker side of human nature was illuminated over 30 years ago during the Stanford Prison Experiment led by Professor Philip Zimbardo.²⁹ The study selected college-aged men with positive attitudes and apparent good mental health and then studied the situational forces and psychological effects of them becoming either a prisoner or prison guard. Zimbardo writes: "My guards repeatedly stripped their prisoners naked, hooded them, chained them, denied them food or bedding privileges, put them into solitary confinement, and made them clean toilet bowls with their bare hands."² The study was halted after only 6 days due to the severe treatment of prisoners and the resulting psychological trauma. Zimbardo concludes:

In a situation that implicitly gives permission for suspending moral values, many of us can be morphed into creatures alien to our own nature.²

Parallels exist between this study and the actions of the Soldiers indicted in the Abu Ghraib scandal. The situational forces present at Abu Ghraib in late 2003 certainly set the stage for the suspension of moral values. Undoubtedly there were multiple human factors existing at the facility, including inadequate training, lack of proficiency in basic Soldiering skills, under-manning, friction between different chains of

command, poor morale, staff inefficiencies, and various psychological factors such as the differences in cultures, Soldier quality of life, real pressures of mortal danger over extended periods of time, and a failure by the command to recognize and mitigate these factors.²⁷ Ultimately, these factors culminated in the now infamous actions of those involved in the scandal at Abu Ghraib.

While direct parallels between the detention camps of today and the POW camps of the past do exist, it would be inaccurate to conclude that no improvements have been made in how the US handles POWs (and other detainees). Typical trends and problems from the past do not exist today in US held camps, such as malnutrition, poor medical care, and high mortality rates. Accountability for individual actions violating the Geneva Conventions or humane treatment policies is enforced as is evident by the legal action taken against those involved with the cases discussed above. Furthermore, prisoners today are provided medical care far superior to that received by most other local nationals. Yet with all the valuable insight gained from our rich historical past, we remain a predominantly reactive rather than proactive organization. Department of Defense and governmental oversight of facilities (Red Cross, combatant command assessment teams, congressional hearings, etc) increased as a reaction to Abu Ghraib, as did the number of internment/resettlement units, policies, regulations, and guidance. Yet none of these correct the lack of planning for future wars, nor the need to better train leaders in the site selection and organization of POW camps, management strategies, and legal recourse, functions ancillary to the basic housing of prisoners, and cultural sensitivity/diversity (ie, Afghanistan is not Iraq). These lessons must be learned to overcome our reactive nature.

Enemy POWs are an inextricable facet of warfare. Acknowledgement of this fact is critical if ever a conflict is to be engaged with the hope of avoiding a legacy of accounts comparable to those from the *HMS Jersey* to Abu Ghraib. In 2005, Senator John McCain proposed an amendment to ban the military and government agencies from engaging in "cruel, inhuman, or degrading treatment" of detainees because apparently the Geneva Convention does not do that already.³⁰ While we support Senator McCain's efforts to ensure that what happened to him should never

happen to anyone else, especially at the hands of Americans, we submit that if proper planning for the handling of POWs in wartime is executed and the mission tasked to those who are properly trained to fulfill it, the horrific stories of POW camps past may truly be history.

ACKNOWLEDGEMENT

Our thanks to Dr Jerold Brown at the Army Command and General Staff College for his positive initial review of the base document for this article. Without his confident endorsement in 2006, it would have most certainly remained unpublished.

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The Reporting and Recording of Unspecified Malaria in the Military, 1998–2007

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BACKGROUND

The diagnosis of malaria should be considered when a febrile patient presents with a history of prolonged overseas travel and/or had worked in malaria-endemic regions. A shrewd and perceptive medical provider should suspect and recognize this disease since most malaria in the United States are imported from other countries.¹

The Centers for Disease Control and Prevention considers malaria as a potential medical emergency.² Technological and clinical competencies are required to avoid diagnostic delays and judgment errors. The gold standard is still a “malarial-smear” that demonstrates the parasite but requires technical skill to perform.

Since 2000, when the US military forces increased its overseas operations in malaria-endemic areas, increasing numbers of malaria cases have been reported through its surveillance database. For years, the numbers of unspecified malaria as a diagnosis had varied widely from 6% (4 of 69 in 2002) to 33% (15 of 45 in 2005), with an overall average of 19.6% (83 of 423 from 2000 to 2005).³ These numbers come only from the Reportable Medical Event System of the US military and does not include other reports that show unspecified malaria, with an alarming proportion of 83% (1,140 of 1,381), obtained from a 10-year malaria query-report of the Defense Medical Surveillance System (DMSS).

This study analyzes the cases reported as unspecified malaria and makes recommendations to improve surveillance of malaria among US service members. An examination of the outcomes across a longitudinal

90-day follow-up period of unspecified malaria from all outpatient, inpatient, and reportable medical event database reports of the DMSS from January 1, 1998, to December 31, 2007, was performed. As shown in Figure 1, there were 3 outcomes reported:

A. Malaria which was later-specified or later-confirmed (a specific malaria-species was identified within the 90-day time frame).

B. Diagnoses that remained unspecified but probable malaria, assigned if any one of the following was present within the 90-day period:

- Another diagnosis of unspecified malaria showed on subsequent follow-up, or the patient was hospitalized with a primary or secondary diagnosis of unspecified malaria.
- A diagnosis of fever or pyrexia 30 days before the diagnosis of unspecified malaria.
- The patient had a prior viral infection 30 days before the diagnosis of unspecified malaria.
- A malarial-smear procedure was performed during any of the clinic visits.
- The unspecified malaria was reported in the reportable medical surveillance system.

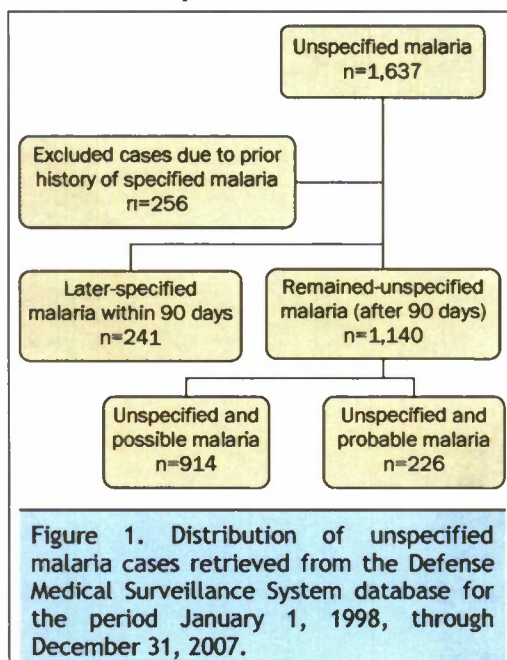


Figure 1. Distribution of unspecified malaria cases retrieved from the Defense Medical Surveillance System database for the period January 1, 1998, through December 31, 2007.

C. Diagnoses that remained unspecified but possible malaria, assigned to those who had either only one clinic visit where a diagnosis of unspecified was made, or who did not have any of the previously enumerated features of the probable malaria.

METHODS

Each military service is required to report all malaria cases through their own public health reporting

systems. These reports are then forwarded to the Armed Forces Surveillance Health Center, where they are merged into the DMSS, and a central repository of military health surveillance data for the Department of Defense. The DMSS contains longitudinal records of all service members personnel, medical, and serological information.³

A retrospective query was performed on the population health data for disease surveillance on unspecified malaria having an ICD-9 CM⁴ code of 084.6, labeling this as the index case. The data was loaded into the DMSS between January 1, 1998, and December 31, 2007. All component services (Active and Reserve Army, Marine Corps, Air Force, Navy, Coast Guard) were taken, and an incidence rule was applied requiring only one unspecified malaria diagnosis.

Each unspecified malaria report included demographic information, date of diagnosis, and whether a malarial smear was performed. Other queries added were diagnosis of fever, recurrent/relapsing/5-day fever, malaria fever, periodic fever, 3-day fever, viral infection within 30 days prior to the index case, and either a Korea or Afghanistan deployment history within 2 years prior to the unspecified malaria diagnosis.

The ICD-9 CM code used 084.6 for unspecified malaria. This code was also used for malaria fever and recurrent fever. Fever, relapsing fever, 5-day fever, periodic fever and 3-day fever were queried using 780.6, 087.9, 083.1, 277.31, and 066.0 respectively. The current procedural terminology codes for blood or malarial smears used were 85060, 86750, 86753, 87015, 87207, 87177, and 87209. The inpatient ICD-9 procedural codes used were 90.5, 91.5, v75.

The data was analyzed using SAS version 9.1 software (SAS, Cary, NC) tabulations. The data was obtained from the health surveillance of the US military population and informed consent was not required for this purpose.

RESULTS

During the 10-year period, 1,637 cases of unspecified malaria were reported among US service members.

For the purposes of the study, 256 records of those who had a prior (90 days before) history of a specific malaria-species diagnosis were excluded.

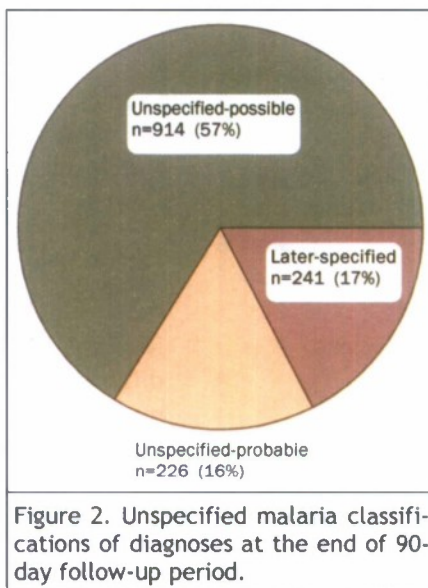


Figure 2. Unspecified malaria classifications of diagnoses at the end of 90-day follow-up period.

The remaining population, totaling 1,381, was labeled as unspecified malaria index cases and selected for analysis (Figures 1 and 2).

Demographic and Clinical Features (Tables 1 and 2)

Later-specified or probable malaria was found mostly among the young (24-years old and younger) in the enlisted ranks of E-4 and below, in the Active component of their service, most probably the Army.

In contrast, possible malaria was found among the older (82%), commissioned or warrant officers (85%), in the Air Force (91%), in the Reserve/Guard component (75%). Clinical features showed that the majority had no fever history 30 days before (75%), did not have any viral infection (67%), had no history of prior Afghanistan and or Korea tours (81%), and had no blood smear taken (68%).

Frequency of Visits

Figure 3 presents the frequency of follow-up visits among the 3 groups. The data for later-specified and probable malaria showed that the majority of those required 2 or 3 office visits, whereas those diagnosed with possible malaria had mostly one visit (>90%).

TEN-YEAR UNSPECIFIED MALARIA REPORT

Figure 4 is a stacked-column chart which illustrates the yearly reported and recorded unspecified malaria diagnoses across the 10-year span. The outcomes during the first 5 years (1998 to 2002) were compared to the last 5 years (2003 to 2007). Possible malaria diagnoses declined 40% during the last 5 years. Likewise, the specified and probable malaria diagnoses increased 70% in those last 5 years.

DISCUSSION

The article examines the meaning and significance of unspecified malaria by defining 3 diagnostic outcomes within a 90-day follow-up period: specified, probable, and possible malaria. The criteria characterizing each

The Reporting and Recording of Unspecified Malaria in the Military, 1998–2007

outcome was established before the database queries were designed. The ICD-9 CM and CPT codes used for retrieving fever, viral infection, and blood smear data were exhaustive and were agreed upon at the beginning of the study. The choice of 90 days to make a further distinction between probable and possible was arbitrary. The assumption was that patients who really had malaria would mostly likely have repeated medical care within this selected time frame. There was no other way of validating the findings except by a reexamination of medical records, which was impractical, and probably impossible.

The finding that 83% (1,140 of 1,381) of the cases remained unspecified 90 days after the initial diagnosis was made, and only 17% (241) were later classified

with a specific malaria-species diagnosis is alarming and needs urgent examination and scrutiny.

This article is a helpful reminder for responsible parties involved with patient care, both directly and indirectly, that prompt attention to the following areas is required:

- Encourage immediate speciation and accurate recording of malaria diagnosis.
- Medical providers should consider malaria in their differential diagnosis among service members returning from theater with demographic and clinical attributes described earlier.

This report also emphasized the need for clinicians to possess high indexes of suspicion when confronted with nonspecific illness among military personnel. The demographic characteristics suggestive of clues to the diagnosis include young, active enlisted, 20 to 24 years of age, with a prior exposure in either an Afghanistan or Korea tour. This report also demonstrated that a majority of these cases will clinically present to the clinician with conditions other than fever or even other than a common viral infection 30 days prior to the

Table 1. Demographic distribution of the investigated unspecified malaria cases.

	Later-Specified Malaria *n=241 (17%)	Probable Malaria †n=226 (16%)	Possible Malaria ‡n=914 (66%)
Military Pay Grade			
E1-E4 (n=509)	120 (23.5%)	103 (20.2%)	286 (56.1%)
E5-E6 (n=390)	83 (21.2%)	66 (16.9%)	241 (61.7%)
E7-E9 (n=130)	12 (9.2%)	25 (19.2%)	93 (71.5%)
Officers (n=338)	20 (5.9%)	31 (9.1%)	287 (84.9%)
Age Category			
under 20 (n=52)	3 (5.7%)	11 (21.1%)	38 (73.0%)
20-24 (n=381)	102 (26.7%)	73 (19.1%)	206 (54.0%)
25-29 (n=280)	55 (19.6%)	58 (20.7%)	167 (59.6%)
30-34 (n=221)	39 (17.6%)	28 (12.6%)	154 (69.6%)
35-39 (n=208)	24 (11.5%)	26 (12.5%)	158 (75.9%)
40+ (n=225)	12 (5.3%)	29 (12.8%)	184 (81.7%)
Branch of Service			
Army (n=750)	184 (24.5%)	172 (22.9%)	394 (52.5%)
Marines (n=83)	13 (15.6%)	11 (13.2%)	59 (71.0%)
Navy & Coast Guard (n=152)	23 (15.1%)	22 (14.4%)	107 (70.3%)
Air Force (n=382)	15 (3.9%)	20 (5.2%)	347 (90.8%)
Component			
Active (n=1,205)	220 (18.2%)	199 (16.5%)	786 (65.2%)
Reserve/National Guard (n=162)	15 (9.2%)	26 (16.0%)	121 (74.6%)

Note: Percentages (%) in table rows are calculated on the number of cases (n) given for that demographic classification.

*Demographic information missing for 6 records in this category.

†Demographic information missing for 1 record in this category.

‡Demographic information missing for 7 records in this category.

Table 2. Clinical factors of the investigated unspecified malaria cases.

	Later-Specified Malaria *n=241 (17%)	Probable Malaria †n=226 (16%)	Possible Malaria ‡n=914 (66%)
Prior Fever History			
No (n=1,225)	173 (14.1%)	138 (11.2%)	914 (74.6%)
Yes (n=156)	68 (43.5%)	88 (56.4%)	0
Prior Viral Infection			
No (n=1,309)	223 (17.0%)	205 (15.6%)	881 (67.3%)
Yes (n=72)	18 (25.0%)	21 (29.1%)	33 (45.8%)
Prior Tour In Afghanistan or Korea			
No (n=955)	81 (8.4%)	101 (10.5%)	773 (80.9%)
Yes (n=426)	160 (37.5%)	125 (29.3%)	141 (33.0%)
Malarial-smear			
No (n=1,330)	221 (16.6%)	195 (14.6%)	914 (68.7%)
Yes (n=51)	20 (39.2%)	31 (60.7%)	0

Note: Percentages (%) in table rows are calculated on the number of cases (n) given for that clinical factor.

*Demographic information missing for 6 records in this category.

†Demographic information missing for 1 record in this category.

‡Demographic information missing for 7 records in this category.

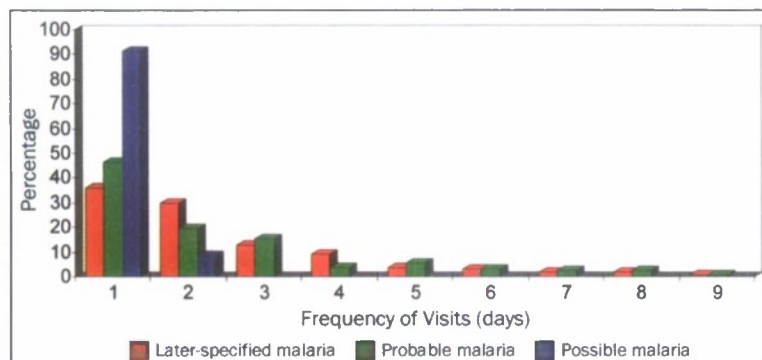


Figure 3. Frequency of follow-up visits of patients relative to the eventual classification of their malaria diagnoses.

index event. The more frequent number of visits was considered suggestive of a probable malaria outcome requiring close follow-up care by the clinician despite remaining unspecified throughout the entire follow-up period.

An important finding calling for immediate improvement is the reporting and documentation of malarial smears performed within military treatment facilities (MTF). Even the later-specified malaria group that confirmed the specific malarial species by smears failed to document this procedure in 92% of cases (221 of 241). MTFs should revisit and review the process of data recording, procedure documentation, and correctness or accuracy of the ICD-9 CM, current procedural terminology, and inpatient ICD-9 procedural codes used.

The limitation of this study is the inability to confirm some assumptions made without looking at the medical records. The 90-day time period was chosen to follow-up unspecified malaria outcomes with an assumption that patients who have malaria will most likely seek medical care within this window.

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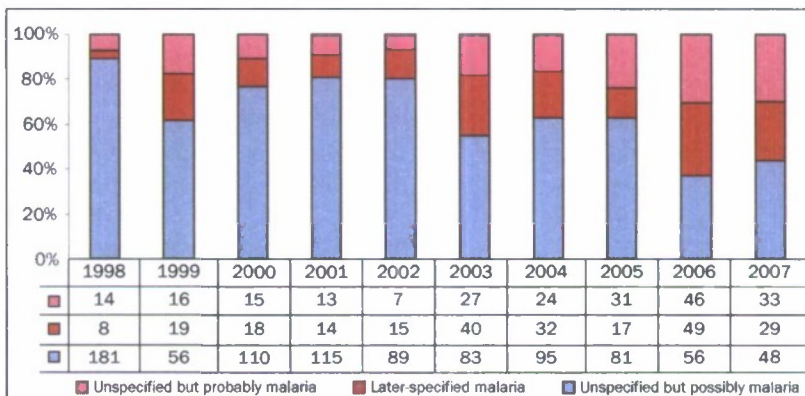


Figure 4. Distribution by year of diagnosis of cases initially diagnosed as unspecified malaria after a 90-day follow-up period.



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Improvement of Force Health Protection Through Preventive Medicine Oversight of Contractor Support

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ABSTRACT

Unprecedented numbers of contractors are used throughout the Iraq theater of operations to alleviate military manpower shortages. At virtually every major forward operating base, US-based contractors perform the preponderance of essential life support services. At more remote sites, local national contractors are increasingly relied upon to maintain chemical latrines, remove trash, deliver bulk water, and execute other janitorial functions. Vigorous oversight of contractor performance is essential to ensure services are delivered according to specified standards. Poor oversight can increase the risk of criminal activities, permit substandard performance, elevate disease and nonbattle injury rates, degrade morale, and diminish Soldier readiness. As the principal force health protection proponents in the Department of Defense, preventive medicine units must be tightly integrated into the oversight processes. This article defines the force health protection implications associated with service contracts and provide recommendations for strengthening preventive medicine's oversight role.

INTRODUCTION

The federal government, including the Department of Defense (DoD), is increasingly reliant on contractors to carry out support functions in contingency operations.¹ The estimated number of private contractors working in Iraq may now top 100,000 and could exceed the actual number of troops in theater.² In addition to US contractors and third country nationals brought into Iraq to work for contracting firms, Coalition forces are also contracting services from local nationals at hundreds of smaller Coalition outposts and joint security sites.

Contracting offers numerous advantages to the DoD. It is an effective way to furnish the massive manpower necessary to construct and sustain base camps, thus freeing Soldiers from these onerous duties and enabling them to focus their energies on winning the counterinsurgency fight. Contracting provides technicians and other highly-skilled professionals such as Arabic interpreters, law enforcement trainers, intelligence analysts, fire fighters, and unmanned aircraft operators that are either critically short or unavailable among the DoD civilian and service member workforce. Contracting also aids in stimulating host nation economies by pumping American dollars to local businesses and employing large numbers of local nationals. On the flip side, the phenomenal growth in contracting has taxed DoD's oversight and accountability systems. This, in turn, has

made thwarting malfeasance, fraud, abuse, and second rate performance more difficult.

THE FORCE HEALTH PROTECTION CHALLENGES OF CONTRACTING

Most of the basic life support services delivered by contractors have direct impacts on Soldier health. These services include pest management, waterworks (ie, potable water production, storage, transport, and distribution), trash disposal, and dining facility operations.³ Heightened disease and nonbattle injury rates in the form of waterborne, foodborne, or vectorborne disease outbreaks could result if these vital services are delivered in a substandard manner.

The contractors themselves can pose a health threat to Soldiers. Most third country national workers originate from less developed countries, where medical care is poor or nonexistent, and communicable diseases such as tuberculosis and hepatitis are highly endemic. The same conditions hold true for their local national counterparts. Without proper precautions, third country nationals and local nationals can transmit diseases to Soldiers. Most contracts require workers to pass a health exam or screening as a condition for employment. There are generally no contract provisions stipulating where these screenings occur. As a result, the majority of screenings are conducted abroad or in the host nation at nonaccredited, insufficiently equipped, and meagerly staffed clinics.

These clinic shortcomings, coupled with rampant corruption and several tuberculosis outbreaks among prescreened third country national contractor populations, makes most screening results dubious at best.

Contracts utilizing third country nationals and US workers usually obligate the contractor to furnish medical care to their employees. Cases of noncompliance are quite common with significant numbers of laborers arriving in theater without the support, equipment, and pharmaceuticals necessary to medically sustain them. When this occurs, the burden of care falls on the DoD medical facilities. Presently, there is no standardized mechanism for the DoD to charge the contractor for delivered medical services, thus allowing the contractor to often escape paying compensation and penalties for this contractual violation.

Bases employing third country national and local national laborers are more vulnerable to attacks on critical infrastructure and intentional contamination of food and water supplies should the contractors harbor hostility towards Coalition forces. As residents and frequent visitors to the bases, these laborers can poison wells, bottled water stocks, and stored rations. They could also destroy critical infrastructure such as reverse osmosis water purification units and radar systems by sabotage or relate invaluable targeting intelligence to insurgent groups. Even without hostile intent, the workers could steal unsecured rations or bring unapproved and contaminated food supplies onto the base to sell or serve to Soldiers.

As the principal proponent for force health protection (FHP), preventive medicine (PM) units must play a decisive role in the contracting process. Their ability to recognize health threats, assess camp sanitation conditions, discern food and water system vulnerabilities, and devise disease prevention stratagems are crucial towards resolving these daunting FHP challenges.

TYPES OF SUPPORT CONTRACTS

The two main types of basic life support service contracts utilized within the Iraq theater of operations are Logistics Civil Augmentation Program (LOGCAP) and contingency contracts in the form of purchase request and commitments (PR&Cs). Each contract type has its own unique quality assurance and quality control processes. For effective oversight to occur, PM must understand these processes and the differences between contract types.

LOGCAP is a worldwide contingency service contract that reinforces military assets with civilian contract support primarily focused on the provision of basic life support services to Coalition forces. The sole LOGCAP provider in Iraq for the Army is KBR, Inc (Houston, Texas) which embeds its personnel within the logistic divisions on the contingency operating bases. LOGCAP services are not contractually authorized for outlying locations with less than 150 Soldiers, with the exception of repairs essential to the protection of life, health, and safety.⁴ Under LOGCAP, contract administration, property administration, and quality assurance are performed by the Defense Contract Management Agency (DCMA).⁵

The more numerous and austere contingency operating locations, such as joint security sites and Coalition outposts, are unsupported by LOGCAP. At these sites, PR&Cs are enacted that employ local national contractors for services that cannot be provided by organic combat support/combat service support assets due to competing missions or lack of skill sets.⁴ PR&Cs are usually initiated at the battalion command level and must include detailed statements of work (SOWs) and 3 bids/estimates from different contractors. Under unique time/safety/mission circumstances, a sole-source contractor may be used.⁴ The SOWs and other supporting documents are compiled into a packet staffed through brigade, division, and corps headquarters before receiving ultimate approval or rejection from the Joint Contracting Command-Iraq. The entire vetting process can take several weeks, especially if the packet is incomplete and the SOW is too vague or poorly written.

FORCE HEALTH PROTECTION SHORTFALLS IN THE LOGCAP OVERSIGHT PROCESS

The DCMA quality assurance representatives are tasked with monitoring the quality of LOGCAP contractor work and assessing their performance. They execute this mission by auditing contractor processes, projects, and internal management controls and receiving monthly assessments conducted by contracting officer representatives (CORs) on specific basic life support services.⁶ In theory, personnel designated as CORs are professionally trained and subject matter experts who possess the technical wherewithal to evaluate their basic life support area. In reality, unqualified individuals are frequently assigned COR responsibilities for expediency sake. This has been especially problematic in the selection of

waterworks and pest management CORs, services which PM personnel are uniquely qualified to assess.

Both quality assurance representatives and CORs use checklists to perform their assessments. These checklists typically mirror checklists found in existing DoD policy documents. For example, the dining facility operations checklist closely resembles Army Form 5162-R, Routine Food Establishment Inspection Report, which is found in *Army Technical Bulletin MED 530*.⁷ Each requirement listed on the checklist is furnished with the name and paragraph number of its corresponding reference document.

If there is no relevant DoD reference document, the requirement is referenced against its corresponding LOGCAP contract task order and section number. Responses to inquiries made to DCMA by this author suggest that PM reviews of checklists and task orders relevant to force health protection occur sporadically, but are not institutionalized document development requirements.

FORCE HEALTH PROTECTION SHORTFALLS IN THE PR&C OVERSIGHT PROCESS

Many of the battalion contracting officers tasked with development, submission, and management of PR&Cs receive no formal training on their duties before they are named to the positions. Since the position is considered an additional duty, the appointing authorities often make opportune appointments and not necessarily assign the person best-suited for the position. In general, these contracting officers are unfamiliar with PM and fail to recognize the FHP implications of the contracts. When coupled with no PM oversight, this unfamiliarity is a recipe for disaster and has led to shoddy contract work and increased health risks. Examples of this include the interior coating of potable water storage tanks with paints mixed/thinned with hazardous solvents, an attempt to purchase and install a \$108,000 commercial reverse osmosis water purification system incapable of treating the exceptionally salty water from a joint security site groundwater source, and efforts to utilize local national personnel who have not received food service sanitation training or medical screening in food preparation positions.

Level II PM (ie, brigade combat team PM sections and division surgeon section PM officers) can prevent PR&C shortfalls by carefully reviewing and inserting FHP stipulations into statements of work. This will provide the contracting officer with a defense against



Iraqi contractor and his son maintaining a trash burning point at a joint security site (February 11, 2008).

poor performance since the contract can be terminated if the local national contractor fails to execute the service in a manner protective of health and safety. A tightly-written statement of work also offers the additional advantage of educating local national contractors on “acceptable” Coalition performance standards, which, in numerous instances, differ from their own. Examples of FHP stipulations that

are often missing in common types of PR&Cs statements of work are shown in the Figure.

STEPS TO ENHANCE CONTRACT OVERSIGHT BY PREVENTIVE MEDICINE

The following changes in PM doctrine, training, leadership, and education practices will strengthen PM’s role in contract oversight processes:

- Clearly define contract oversight responsibilities in PM policy documents. Current doctrine is woefully insufficient on this subject. For example, there is no discussion of contract oversight in *Army Field Manual 4.02-17*,⁸ the Army’s premiere guidance document on the organization, mission, function, capabilities, and employment of deployed PM elements.
- Establish a rapport between Headquarters, DCMA, and the service medical authorities to ensure FHP is integrated into LOGCAP and PM input is incorporated into contracting officer representative checklists. A joint working group comprised of Army, Navy, and Air Force PM experts could be created to collectively address FHP-related contracting issues, should excessive confusion arise from each of the individual service’s respective PM proponents interactions with DCMA. The Armed Forces Pest Management Board, a jointly staffed organization, is pursuing this approach to address vector control services. The joint working group could also include health care administrators to discuss the compensation mechanisms associated with contract labor use of DoD medical assets.

- Appoint PM officers and noncommissioned officers (NCOs) as the waterworks and pest management contracting officer representatives at LOGCAP sites. Since these Soldiers receive extensive training on water production and storage site inspections, water system vulnerability assessments, and integrated pest management practices, and deploy with the equipment needed to monitor water quality and conduct pest surveillance, they are ideally suited to assume contracting officer representative responsibilities. At forward operating bases, where both level II and level III PM (ie, PM detachments) are present, level III PM should; by default, be designated as the lead evaluators. This is in deference to their greater professional experience and higher rank command structure.

- Task PM detachment entomologists (area of concentration 72B) to provide technical support to all pest management contracting officer representatives (CORs) within their respective geographical mission support areas. With a minimum of a master's degree in entomology and graduation from the DoD certified pesticide applicator course, they are the best-trained, uniformed, pest management professionals in theater. Their expertise should be put to good use training CORs in the evaluation of performance oversight roles and performance standards.

- Introduce contract oversight and PR&C statement of work reviews as part of the 6A-F5: Principles of Preventive Medicine Course, and the 6A-F6: Preventive Medicine Program Management Course, both of which are taught at the Army Medical Department Center and School. Incorporate contract oversight and statement of work review into Combat Training Center scenarios and US Army Center for Health Promotion and Preventive Medicine (USACHPPM) technical assistance visits.

- Recommend that all officers and senior NCOs assigned to level II and level III PM units enroll and complete the Defense Acquisition University's online COR course.* The course provides an excellent overview of COR ethics, duties, and responsibilities. Course completion is a prerequisite for COR position assumption. Completion prior to deployment is preferable due to the connectivity challenges and online time constraints commonly encountered in theater.

*Information available at <https://acc.dau.mil>

†Information available at oehs@amedd.army.mil

Contracted Service	Necessary Force Health Protection Stipulations
Chemical latrines (portable toilets)	Mount and maintain hand sanitizer dispensers Use 62% ethanol-based hand sanitizers Refill with a "blue water" solution after emptying
Trash removal	Pressure wash/clean dumpsters on a monthly basis Require functioning dumpster lids and replacement when broken Request metal dumpsters rather than plastic (metal dumpsters are preferable since trash can be burned inside them when overfilled or the contractor fails to empty them on schedule)
Bulk water deliveries	Delivered water must have a minimum 2 PPM and maximum 5 PPM residual chlorine Truck must be cleaned and inspected by field sanitation team member before acceptance of delivery Water must meet acceptable aesthetic qualities (color, odor, and clarity) as determined by PM
Local national janitorial support	Restrict laborers from direct food handling, preparation, and serving Prohibit sick individuals from working
Building renovation and construction projects	Ban use of paints with added diesel fuel, benzene, and other thinners Instruct contractor to use practices that minimize aerosolization of paint chips, insulation, and other debris to reduce exposure risks to Coalition forces
Examples of force health protection stipulations that should be included in purchase request and commitment statements of work.	

- Furnish CORs of other basic life support services with copies of relevant inspections and alert them to force health protection related deficiencies which are detected during PM assessments and inspections. For example, the food service and Morale, Welfare, and Recreation CORs should be notified when contractor-operated dining facilities and fitness facilities fail their routine sanitation inspections. This will aid those CORs to more accurately assess performance and exert their considerable influence in rectifying deficiencies.

- Archive completed waterworks and pest management COR checklists in the USACHPPM occupational and environmental health surveillance data archive.† Competent and diligent performance of these services is vital for the creation of salubrious environmental health conditions at base camps. The health consequences of substandard performance can be severe and may not become evident until long after the

deployment. By archiving the checklists, epidemiologists could better understand site health conditions and diagnose the causes of post deployment medical problems were they to arise.

- Assist contracting officers in preparing the initial PR&C statements of work. This step would foster teamwork between PM and battalion contracting officers, strengthen the FHP provisions within the statements of work, reduce approval delays, and better educate the contracting community about the importance of PM and how to write contracts protective of health.

- Formalize the PR&C packet staff approval process to mandate level II PM review of all statements of work bearing FHP implications, with the initial and final PM reviews performed by brigade combat team and division surgeon section PM officers; respectively. Such a process would ensure that FHP concerns are addressed at the lowest levels, expediting packet approval and contract letting. This was done with much success by the Multinational Division-Baghdad (MND-B) staff through an automated process that permitted each section to examine scanned statements of work in digitized packets on the secure internet protocol router email and either approve, approve with comments, or reject the contract.

CONCLUSION

Whether it is LOGCAP-provided cooks feeding headcounts into the thousands at a large forward operating base dining facility, or an Iraqi entrepreneur pumping out chemical latrines at a joint security site or Coalition outpost, contractors are now the main providers of basic life support services at forward operating bases. Contractor performance directly impacts the health and welfare of our Soldiers, but the current oversight mechanisms necessary to champion force health protection are insufficient. The solutions to this problem will require a concerted effort by commanders, logisticians, and the PM community, and implementation of numerous enhancements to contract oversight processes.

ACKNOWLEDGEMENTS

I wish to extend special thanks to LTC Peyton Potts, MND-B G4 LOGCAP Officer, and MAJ Robert Huber, MND-B Contracting Officer, for their review and input on the

contracting processes. Also, LTC David Ristedt, MND-B Division Surgeon, Troy Ross, the MND-B Preventive Medicine Officer, and MAJ James Waddick, MND-B Deputy Division Surgeon, provided invaluable input to this article.

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Health Sector Development in Afghanistan: The Way Forward

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OVERVIEW

Health sector development is a critical component of nation-building and a cornerstone of any exit strategy for US and coalition forces in Afghanistan. The current fragmented organizational structure of military health care assets is not conducive to comprehensive development efforts.¹ Centralized planning and direction are essential to unity of effort and a necessary ingredient to the coordination of health sector development in Afghanistan. An organizational structure is needed that enables leaders with vision to vector military health sector strategy development. The direction must be aligned with the Afghan National Development Strategy, civilian organizations, and coalition partners operating throughout the theatre. As a lesson for future nation-building operations and reinforcement of the concepts outlined in this paper, Jones et al² observed that successful health sector development efforts must include effective planning, coordination, and leadership. The price of failing to act can be quantified not only in fiscal and material terms, but in human tragedy as well.

INTRODUCTION

Health sector development in Afghanistan is foundational for the future viability of the government of Afghanistan and the health and welfare of its people.² In fact, as stated by the US Joint Forces Command, "a viable health sector is vital to a nation's well-being."^{3(p7)} Statistics from UNICEF, presented in the Table, show nearly zero improvement in under-5 mortality

and infant mortality rates, among other significant public health measures.⁴ Unfortunately, health sector development in Afghanistan is suffering from a lack of centralized planning and direction. While numerous military professionals of all backgrounds and affiliations are doing a great deal of things to try to help the people, government, and country of Afghanistan, there is a tremendous lack of unity of effort within the military structure in the arena of health sector development. The way ahead will require significant change, including a reorganization of healthcare services in theatre, dynamic leadership, and the development of an achievable and coordinated strategic plan that will generate unity of effort.

ORGANIZATIONAL STRUCTURE

Organizational structure serves as an enabling backbone. In Afghanistan, the organization of healthcare services is fractured, particularly as it pertains to health sector development, resulting in a dysfunctional execution of strategy. The Afghan health system has 3 major components: the Ministry of Public Health (MoPH) for the civilian sector, the Ministry of Defense (MoD) for the Afghan National Army, and the Ministry of the Interior (MoI) for the Afghan National Police, among other security services. All of these components contribute to the national health of Afghanistan.

The healthcare assets of coalition forces in Afghanistan also have a number of major components (Figure 1). One element of the US Forces-Afghanistan is a staff

Comparative child survival and birth statistics for Afghanistan showing essentially no improvement in a 17-year span.
Source: United Nations Children's Fund⁴

Children under age 5 mortality rate (per 1,000 live births)	
Calendar Year	
1990	260
2007	257
Infant (under 1 year) mortality rate (per 1,000 live births)	
1990	168
2007	165
Crude birth rate (number of births per 1,000 population)	
1970	52
1990	52
2007	48

Health Sector Development in Afghanistan: The Way Forward

medical planner who has recently arrived on scene. The International Security Assistance Forces (ISAF) staff headquarters has primary responsibility for strategic guidance regarding reconstruction and development. The ISAF mission consists of 41 nations. There are 28 provincial reconstruction teams (PRTs) located across Afghanistan, task organized under maneuver task forces within regional commands with a mission to help develop and aid in governance and development. To complicate the organizational structure, the PRTs are situated across 5 regional commands, each with a different lead nation. To complicate the organizational structure, the PRTs are located in 5 regional commands, each with a different lead nation. The Combined Security Transition Command-Afghanistan (CSTC-A), whose efforts are directed at the Afghan National Army and National Police, is responsible for embedded training teams and police mentor teams. The Combined Joint Special Operations Task Force-Afghanistan, with its unique mission, provides direct patient care of an episodic nature in high value geographic locations. In the near future, a medical command will be added to the fray. Finally, there are a number of task force maneuver units which arrive and operate with their own medical assets under the control of a line commander. The end product of this conglomeration is a command and control system which has little unity of effort toward health sector development.

There are 11 units with medical assets located at Bagram Air Base alone. Each of those medical resources is organic to a combat arms unit and are dedicated solely to that specific unit. Consequently, those medical assets are at risk of being underutilized in their medical specialties (depending on the operations tempo) and unavailable to provide support to other medical functions without prior coordination and authorization. While each unit brings skills, expertise, and workload capacity to Bagram Air Base, there is little coordination of effort on the installation. As is the case in many locations and in many organizations across Afghanistan, there are superb medics in the task forces that are doing great things in isolation. However, because there is very little unity of effort, these advances are often unsustainable. This is the end result of an absence of an enabling strategy for comprehensive health sector development.

Further complicating the organizational structure of health services in Afghanistan are the existence of

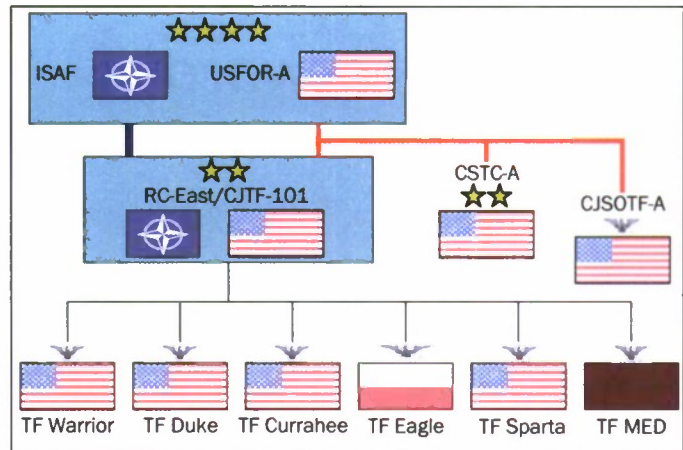


Figure 1. The command organization of coalition forces with healthcare assets in Afghanistan.⁵

Glossary

- ISAF: International Security Assistance Forces
- USFOR-A: US Forces-Afghanistan
- RC: Regional Command
- CJTF: Combined Joint Task Force
- CSTC-A: Combined Security Transition Command-Afghanistan
- CJSOTF-A: Combined Joint Special Operations Task Force-Afghanistan
- TF: Task Force

numerous civilian organizations. The United Nations Assistance Mission in Afghanistan is a coordinating body to which a US military liaison officer is assigned. The European Commission works with multiple nongovernmental organizations (NGOs), including the International Medical Corps, Aide Medicale International, Health Net International, Medical Refresher Course Afghanistan, among others. The US Agency for International Development (USAID) also works with numerous NGOs including Bactar Development Network, Norwegian Afghan Corps, Sanayee Development Organization, Afghan Development Association, Adventist Development and Relief Agency, among others.⁵ Many of these organizations have designated geographic responsibilities and all are heavily involved in health sector development efforts.

Military units and civilian agencies, along with Afghan organizations, contribute to health sector development. At times, the missions of these organizations intersect, however, their efforts are often uncoordinated. In fact, a stove-piped structure of funding and leadership has evolved which limits vision and inhibits cooperation. There is a published commander's intent which enables decentralized execution, but there is little or no

centralized planning or control as advocated in joint doctrine.^{6(pIV-16)} The fractured structure dates back several years and is likely an evolutionary result of funds allocation in the area of responsibility. In practice there is little, if any, interagency coordination.

The funding environment in Afghanistan is extremely complex. A number of "colors of money" exist including:

- Commander's Emergency Response Program funds which are earmarked for urgent humanitarian relief and reconstruction.
- Afghanistan Security Forces Funds, often referred to as Title 22, which are provided through CSTC-A for training and sustaining Afghanistan National Security Forces.
- Title X funds for active duty personnel and operations, Field Order Officer funds used for US Forces only and generally available for expenses less than \$10,000.
- Overseas Humanitarian Disaster and Civic Assistance funds sponsored by the US State Department.

In addition, organizations such as USAID, the European Commission, and numerous NGOs, as well as the MoPH, have their own funding sources, rules, and regulations. Given all these "colors of money," there are funds available for comprehensive health sector development and capacity building missions, but the complexity required in this system encourages thinking within the confines of the funding stream. In addition, each type of funding comes with its own administrative rules and reviews.⁷

What has evolved is a system of decentralized planning and execution among the many uncoordinated agencies and units in Afghanistan. Essentially, many civilian agencies and military units are moving forward in their respective lanes as they understand and interpret their role within the Afghan National Development Strategy (ANDS) construct, and the strategic and operational environment. The consequence of this uncoordinated approach is isolated progress which is unsustainable over the long-term. This unsustainable progress will potentially undermine the credibility of the coalition and the government of Afghanistan in terms of health sector development. However, the coordination and combined efforts of

healthcare resources in Afghanistan could have a positive tangible and sustained impact on the country's healthcare infrastructure.

STRATEGIC DIRECTION

Within the framework of the ANDS, a new and comprehensive strategic direction is necessary for the future of health sector development in Afghanistan. While US and coalition forces provide superior and well-coordinated care to wounded Warriors, the humanitarian support and infrastructure development missions are shrouded in fog and friction, not caused by the war, but products of the organizational structure and bureaucracy that has developed over time. The way forward lies in improving the capacity and capability of the Afghan health system through training and skills development of healthcare professionals and support staff, as well as through bricks and mortar. While training and capacity building are integrated into some existing strategy, including that of Combined Joint Task Force-101 (CJTF-101), execution is more problematic.

As one example, the International Medical Mentorship and Training Program (IMMTP) is designed to improve the human capacity of Afghan physicians across the country and is synergistic with a 2-week program targeted at Afghan nurses and ancillary medical staff. The program applies to all the major healthcare entities in Afghanistan, including MoPH, MoD, and MoI, and is a cooperative effort among the US, Korean, and Egyptian hospitals on Bagram Air Base. Unfortunately, the funding mechanisms in place are not structured to support such a program, as it crosses funding streams. Despite a nominal cost and support by the commanding general, CJTF-101, funding remains elusive. As a consequence, instead of receiving training 6 days a week over 90 days in 3 coalition hospitals, the first 5 physicians in the program traveled to and from Bagram Air Base from outlying areas 2 days a week over the 90-day period. The second class started in February 2009, with subsequent cohorts of students entering training every 6 weeks. However, attendance of cohorts in the future is at serious risk if funding issues are not resolved. Currently, the commitment of the Afghan government is illustrated by the agreement of the MoPH, MoD and MoI to fund the salaries of their students for the duration of the program. After 5 years of failed attempts at starting such a program, the IMMTP has

Health Sector Development in Afghanistan: The Way Forward

begun and has taken a major step forward in building relationships and capacity within the Afghan health system. As stated by the US Joint Forces Command,

Sustainable projects that restore and build [host nation] capacity, especially in public health systems, achieve longer and wider spread results than limited scope direct patient care projects. Capacity building also garners positive good will and political capital without creating misplaced dependency and does not undermine [host nation] legitimacy to govern.^{3(p10)}

The US is currently in jeopardy of losing one great opportunity.

There are a number of viable solutions to the strategic quandary that exists for health sector development in Afghanistan. First, a number of medical challenges must be understood, including the irregular environment, the health and security relationship, and the accomplishment of a health sector assessment that enables the development of a strategy that leads to a “culturally appropriate health sector capacity that garners long-term positive effects for the commander.”^{3(p3)} The Afghan National Development Strategy should serve as a guide for such efforts for both military affiliated and civilian resources in country. The fifth pillar of the ANDS, health and nutrition, is based upon the basic package of health services (BPHS) and the essential package of hospital services (EPHS), which are foundational in meeting the healthcare needs of the people of Afghanistan over the long-term.

The statement from *Joint Publication 1*,

Attaining unity of effort through unity of command may not be politically feasible given the sometimes divergent missions of all the involved organizations, but it should be a goal.^{6(pxix)}

is directly applicable to the coalition. The command and control network for military health sector development should be reorganized, including a plan for integration that links the major players in the area of responsibility and creates a central vision. According to the *Doctrine for the Armed Forces of the United States*,

Integration is achieved through joint operation planning and the skilled assimilation of forces, capabilities, and systems to enable their employment in a single, cohesive operation rather than a set of separate operations.^{6(pIV-17)}

Leadership will be critical to this end, including those of appropriate rank and ability to execute such a monumental task. A funding system that can accommodate the uniqueness and needs of the environment will be essential to the development and support of any strategic initiative. In addition, the establishment and measurement of important objectives, based upon public health goals as advocated in the BPHS and EPHS, are essential. The adoption of long-term public health measures, such as infant mortality and malnutrition, will force a paradigm shift in how business is normally conducted. Finally, perspective of time has to adjust from one focused on short-term goals tied to annual personnel evaluations and deployment rotations (6 to 12 months) to one focused on real substantive change in 5 to 10 years. The US and its coalition partners cannot afford to continue to fight one year wars, particular as that fight pertains to health sector development.

RECOMMENDATIONS

...the joint medical community must expand its interagency and multinational relationships; joint force commanders should seek innovative ways to employ medical capabilities to help achieve security and stability;...^{3(p3)}

Beyond the joint force, it is imperative that the efforts of the joint and combined force be aligned with the multitude of NGOs and aid agencies operating in Afghanistan to potentiate and sustain the effects. Three specific recommendations include:

1. Dedicate resources specifically for health sector development and clearly align the health sector development mission under one joint medical command and control element (JMC2E).*

- A. Obtain a funding source dedicated entirely to health sector development.
- B. Funding is appropriated to the JMC2E for execution.

The medical command that is currently in the process of deploying to Afghanistan has the potential to be a significant factor in the unity of command through the provision of a centralized planning framework. More importantly, the medical command structure should be

*The concept of a “medical command and control element” was originated by LTC Mark McGrail, then the CJTF-101 Surgeon.

modified to become a JMC2E function. The primary mission of US military medical units is to provide care to US service members. The probability of making real, timely, sustained progress would rise dramatically if the health sector development function was

- established as a separate and important mission,
- recognized as an essential element of any exit strategy, and
- specifically allocated to the JMC2E which was then given the appropriate resources to execute that mission.

A proposed organizational structure is presented in Figure 2. As it currently stands, health sector development is a secondary mission for most units operating in theatre. The empowerment of the JMC2E must include planning responsibility for all military medical assets in theatre, including those of CSTC-A, CJTF, and the Combined Joint Special Operations Task Force, ensuring unity of effort. Any healthcare lead in Afghanistan must be joint in structure and operation. Establishing the JMC2E Surgeon as the US Forces-Afghanistan Surgeon is a beginning. However, providing the element with the necessary resources, including funds earmarked for health sector development, would give the element both the authority and the responsibility to execute its mission.

If health sector development truly is important, significant resources must be dedicated to it. In the short term, this can be accomplished by adding more personnel with public health training to incoming medical units such as the medical command. In the long-run, success will require changes to current philosophy and changes to organizational structure to complete health sector development missions.

Funding mechanisms must be established that do not involve an inordinate approval process that impacts the timeliness of execution of health sector initiatives. A congressional mandate through the Department of Defense may be required to establish the authority to fund health sector development directly and eliminate competition with other developmental initiatives.

2. Ensure the right people (leaders) are in the right places with the right training and credentials. Strong and visionary leaders will be critical to changing course and aligning medical resources in-country.

Leaders for health sector development, at the JMC2E and in supporting units, must, at a minimum, have public health education, background, and/or experience and rank appropriate for the authority, responsibility, and importance the function holds. As shown in Figure 2, the staff responsible for health sector development planning need to have an appropriate mixture of administrative experience critical to planning and process, clinical experience necessary for medical development, and mobility enough to engage in relationship building and sustaining those relationships across Afghanistan. It is unknown at this time if the JMC2E will have this capability; however the element must be supported through **joint** action by the military and other US and international agencies (Air Force, Navy, Army, Public Health, US Agency for International Development, European Commission, United Nations Assistance Mission in Afghanistan, etc) to provide the manpower needed to expand its mission of health sector development.

Presently, medical leaders are expected to have experience in health sector development. The military would be better positioned if training were modeled in homogeneous currency based platforms across all services to develop the critical skills needed to contribute to health sector development, similar to the Air Force's "Flight Path" methodology for personnel development.⁸ This approach would be particularly effective if the health sector development mission is incorporated into each unit. Coordination of efforts should not be expected but required, thus optimizing unity of effort. If health sector development is not made a priority for military units, the combination of low priority, a lack of training, few available resources, and leadership that is not dedicated to the mission will lead to failure.

3. Develop a long-term strategy for military medical assets that establishes clear objectives and aligns resources toward accomplishing Afghan National Development Strategy objectives. The strategy should follow ANDS goals and be coordinated with all medical agencies in Afghanistan, including USAID, the European Commission, and associated NGOs.

Partnerships with other military and civilian organizations are essential for successful health interventions during stability operations.³ The JMC2E

Health Sector Development in Afghanistan: The Way Forward

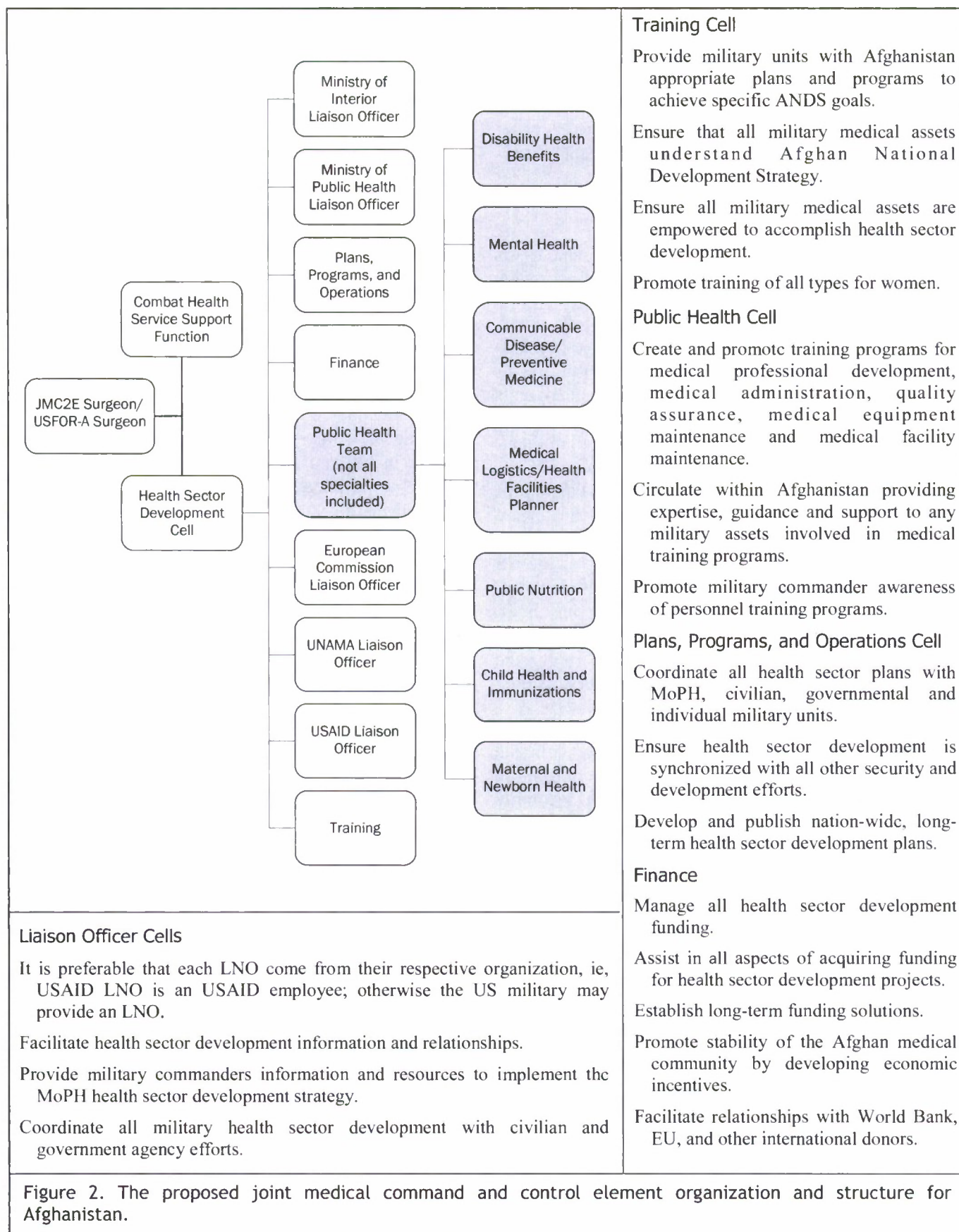


Figure 2. The proposed joint medical command and control element organization and structure for Afghanistan.

would be responsible for nurturing relationships with other agencies in Afghanistan and coordinating efforts across organizations to amplify the effect of health sector development efforts and initiatives. Given that the US military will be in Afghanistan for an extended period of time, the JMC2E is really a solution of 2 to 3 years in duration. A more robust organization, designed around the concepts and principles described in this paper, will have to be established to support an enduring effort to develop the Afghan medical infrastructure. Moreover, a sustainable economic model with an entrepreneurship bent is a critical part of the strategic direction needed to ensure the fiscal viability of the health care system. Afghan medical providers need economic security and incentives to keep them from seeking opportunities in the United States or abroad.

The time for action is now. Military participation in health sector development is critical to nation building efforts and any exit strategy. Lives, limbs, and livelihoods of US Soldiers, Marines Sailors, and Airmen, as well as those of our coalition partners and the Afghan people hang in the balance.

ACKNOWLEDGMENT

The authors acknowledge the particular contributions to the content and message of this article by the following colleagues who were also serving and, in some cases, continue to serve in Afghanistan:

CPT Kristy Linginfelter, SP, USAR, Surgeon/Physician Assistant, 426th Civil Affairs Battalion

Lt Col Garry Feld, MSC, USAF, Deputy Commander of Administration, Joint Task Force MED

Col Douglas Anderson, MSC, USAF, Lead Mentor, CSTC-A Afghan National Police

CDR Evelyn Quattrone, NC, USN, Officer in Charge, Cooperative Medical Assist Team

MAJ Maureen Nolen, AN, USA, Task Force MED J-5, Plans and Programs

Lt Col Tamara Averett-Brauer, NC, USAF, Chief Nurse, Task Force MED

We thank all of you for your insight, service, and diligence in working to leave Afghanistan better than you found it.

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Army Transformation and Level II Preventive Medicine Within a Deployed Division Task Force

MAJ Kenneth D. Spicer, MS, USA

Change is hard because people overestimate the value of what they have—and underestimate the value of what they may gain by giving that up.¹

INTRODUCTION

Throughout military history, preservation of the health of the force has been one of the greatest combat multipliers. Sound preventive medicine (PM) mitigates disease and nonbattle injuries and keeps the Soldier fit to fight. In 2004, Army transformation began to drastically change how PM support is provided to combat units in the deployed environment.

The author experienced transformation of division PM assets first hand when serving as the division environmental science and engineering officer (ESEO) in the Army's last remaining main support battalion, and then deploying to Multi-National Division North, Iraq with the restructured 1st Armored Division headquarters as the staff ESEO from September 2007 to December 2008. From a division staff officer perspective, this article provides a description of how force health protection for the ground Soldier was more effectively delivered as a result of Army transformation. Field commanders and medical personnel at all levels should be aware of remaining challenges and opportunities resulting from the reorganization of PM assets across the operational environment. The information presented here may also serve as a useful after action review tool for any PM Soldier that might potentially serve at the brigade combat team or division level in a counterinsurgency environment.

BACKGROUND

Prior to the Army Transformation in 2004, division PM personnel who provided level II support were colocated within the medical company of the main

support battalion. Modularization essentially decentralized the division's PM personnel. As discussed by Ciesla,² this profoundly increased the demand for ESEOs and placed a much greater emphasis on force health protection. While the previous model assigned one ESEO in support of an entire division,³ modularization places an ESEO on the division staff and one in each brigade combat team (BCT).⁴

The 1st Armored Division served as the headquarters for Task Force Iron during the Operation Iraqi Freedom 07-09 rotation. Task Force Iron was composed of more than 24,000 US service members throughout northern Iraq, and included 4 brigade-sized maneuver elements (BCTs*). The 3rd Armored Cavalry Regiment had not yet transformed and was assigned one preventive medicine specialist (staff sergeant, military occupational specialty 68S30). The other 3 brigades were modular in structure, and each was assigned one ESEO and one PM specialist. With the rapid expansion of base camps to accommodate counterinsurgency operations in Mosul City, US Soldiers lived and operated out of more than 90 different base camps across the division operational environment. Base camps included contingency operating bases, contingency operating sites, and contingency operating locations which differed based on the size and number of personnel supported. For example, the largest, a contingency operating base, may sustain between 20,000 and 25,000 personnel, while a contingency operating location usually had no more than a platoon of Soldiers on site.

CHALLENGES

Regarding his strategy of establishing joint security stations in key locations, General Petraeus said "you can't secure the people if you don't live with them."⁵

*Throughout this article, brigade-sized maneuver elements are referred to as BCTs. They include infantry brigade combat team, heavy brigade combat team, stryker brigade combat team, armored cavalry regiment, and stryker cavalry regiment. *The Author*

Tactical dispersion of multiple, austere base camps in urban areas required additional field sanitation and PM support.

Level I PM - Field Sanitation Teams

Doctrine requires every company-sized unit to have functional field sanitation teams (FSTs).⁶ Generally, Task Force Iron BCTs with organic PM assets met the FST requirement for each company. The ESEO and PM specialist conducted predeployment training and certification. Units' FST personnel were tracked by name and held responsible for conducting level I PM in their respective operational environment.

Field sanitation teams were usually dysfunctional or nonexistent at contingency operating locations where small military, police, or border transition teams lived and worked closely with Iraqi Security Forces in extremely austere environments. Although basic field sanitation is part of predeployment training, and team medics receive a 2-hour block of instruction upon arriving in theater, they typically do not receive the comprehensive 40-hour FST certification course at their respective home stations. As a result, organic level I PM was not adequate at transition team sites, especially at the beginning of a team's deployment.

Healthcare specialists in the operational environment should take ownership of this important responsibility. In the current operational environment, medical personnel bear the brunt of FST duties whether they are FST trained or not. Current doctrine states that at least one FST member must be a medic, if available. This doctrine should be amended to mandate that all medics fulfill FST duties. Further, initial training for medics should be expanded to include detailed field sanitation topics. With this training, the FST program in a combat unit can be transitioned solely to medical personnel.

Level II PM Teams – Stretched Thin

Even with acceptable level I FST support at the majority of base camps, level II PM personnel operated at maximum capacity for the duration of their deployment. With a division operational environment consisting of over 90 base camps, each of the 4 brigade PM teams covered an average of 23 sites. For the modular BCTs with an ESEO and a PM specialist, this was a daunting task. The job was virtually impossible for the staff sergeant PM specialist who was solely responsible for up to 25 sites in the 3rd Armored Cavalry Regiment operational environment.

The goal was to conduct a monthly base camp assessment of every site. Given the workload and limited personnel, it was up to each level II PM team to prioritize site assessments based on need, number of personnel supported, and degree of contracted life support. Small base camps in austere environments usually had the greatest need. Larger contingency operating sites and bases had many more personnel, more contracted life-support functions, and overall better field sanitation.

According to *Army Field Manual 4-02.17*,⁷

Tactical dispersion places combat elements largely on their own for PM self-protection; however, there are opportunities for PM detachments to provide support in these situations. The detachments must seek out such opportunities and give priority to the combat elements... Preventive medicine detachments provide the most responsive support when they work directly with units at the greatest risk.

Two PM detachments, each with a modified table of organization and equipment* authorization of 13 Soldiers, provided level III support in the Task Force Iron operational environment. They focused their operations primarily on the highly populated logistical hubs of Contingency Operating Base Speicher and Joint Base Balad. After the rapid expansion of base camps in Multi-National Division North, both of these units stepped up and provided vital support to the Task Force Iron BCT PM assets. Since the PM detachments' higher headquarters was the medical brigade and not Task Force Iron, the division surgeon coordinated with the MNC-I surgeon for PM support from the medical brigade for 12 different base camps. This synchronization of effort between BCT level II PM and detachment level III PM paid tremendous dividends.

Doctrinal change for the composition of BCT PM assets is warranted in a time of persistent counterinsurgency operations that involve multiple dispersed base camps in harsh environments. Sames et al⁸ notes that a BCT PM team is composed of 2 relatively junior personnel. PM detachments will have to continue to fill the gap by performing a level II PM mission if no doctrinal change is made. The BCT ESEO and PM specialist should be augmented with another, more experienced PM specialist to ensure more thorough base camp coverage. Alternatively, the junior PM specialist could be replaced with a seasoned

*Defines the structure and equipment for a military organization or unit.

noncommissioned officer, significantly boosting the experience level of the BCT PM team and helping to facilitate practical, simple, and efficient solutions to units' field sanitation concerns.

PM Relationships with the Iraqi Security Forces

*Helping others to help themselves is critical to winning the long war.*⁹

Addressing field sanitation and general PM issues with our Iraqi Security Force counterparts was a constant challenge. The primary focus was issue resolution in conjunction with Iraqi Security Force self-sustainability. Poor infrastructure, resource availability, and cultural differences contributed to conditions that occasionally threatened the health of Task Force Iron personnel. Transition teams living on base camps adjacent to Iraqi Security Force base camps were most often affected. Examples include a burst main sewer line and an entire sewer system that suddenly stopped functioning due to lack of fuel for the generator-powered lift stations. The BCT PM team identified the immediate health threat from sewage overflow and implemented basic personal protective measures against vector-borne diseases.

The larger problems dealt with Iraqi Security Force sustainability and prevention of similar incidents. Who repairs the pipe? Who supplies gas for the generators? With what money? How can the lift stations be connected to the local grid so generator power is unnecessary? The division ESEO collaborated with other key staff sections such as division engineer (G-7), logistics (G-4), and Iraqi Security Forces to facilitate long-term, self-sustainable solutions to problems that had public health repercussions to Task Force Iron personnel. This is a clear advantage resulting from transformation and the division staff ESEO position.

OPPORTUNITIES

Modularity and the resulting reorganization of PM personnel in BCTs and the division headquarters have certainly provided new opportunities and allowed for creative solutions to public health concerns in the deployed environment.

Mobility

Traveling across the operational environment to accomplish the PM mission was one of the greatest hurdles to overcome. Travel by helicopter was limited

to hours of darkness, required extensive coordination, was notoriously unreliable, and had limited space for PM equipment. Ground convoy or combat logistics patrols were used to conduct the majority of PM missions. The location of the BCT PM team within the brigade support battalion was ideal for coordination of predictable and reliable travel to all base camps.

Force Protection Dogs

US Army 5th Corps General Order Number 1 (March 19, 2003) forbid the use or adoption of mascot animals, but the prohibition was routinely ignored throughout Iraq. Mascot dogs were present on approximately 20% of the base camps throughout the Task Force Iron operational environment. To address the issue, all division ESEOs collaborated with the MNC-I force health protection office and theater veterinary officials to establish a force protection dog program. The animal would no longer be classified a mascot if it was:

- Employed as a legitimate force protection asset (ic, patrolling, early warning, watch dog),
- Examined by a veterinarian and received a rabies immunization, and
- Posted on official orders signed by the unit commander. BCT PM teams facilitated the success of this effort by assisting with transportation of veterinary assets and maintaining accountability of compliant versus noncompliant animals in their respective operational environments. Over 40 dogs in Multi-National Division North were part of the program, which ultimately allowed the unit to keep the animal for a legitimate purpose while mitigating the associated health risk.

Division Force Protection Working Group

The division ESEO served as the surgeon cell representative on the force protection working group. Other team members included senior noncommissioned officers and officers from the G-7, safety, and provost marshal cells. Focusing on the smaller base camps more vulnerable to enemy action and field sanitation issues, team members personally visited 95% of all contingency operating sites and contingency operating locations in the Task Force Iron operational environment. This was an excellent chance to redefine traditional force protection that focuses on barriers and concertina wire. Incorporating force

health protection, specifically preventive medicine, into this division-level working group accomplished 4 significant objectives:

- Inserted a medical aspect into protecting the force and keeping Soldiers in the fight. This combat multiplier demonstrated to the Warfighter that medical authorities bring more than traditional patient evacuation and treatment to the fight.
- Increased command emphasis of preventive medicine issues and the willingness to follow through with BCT PM team recommendations. Unit leaders on the ground were more receptive to a division-level assessment team with an ESEO (rank of Major) conducting a PM assessment. The division commander provided command emphasis at the highest level when he directed that all recently completed PM assessments and outstanding issues be briefed at the weekly battle update assessment. This truly put PM at the forefront and facilitated the BCT PM team mission.
- Allowed the division ESEO to travel throughout the entire operational environment [a rare opportunity for division staff officers] and really understand issues the BCT PM teams were facing. The junior BCT ESEOs, most of whom had less than a year of service in the Army, accompanied the force protection working group team when possible. They were able to receive face-to-face instruction and mentoring from a more seasoned ESEO.
- Facilitated the quality of life working group, a chaplain-led initiative to improve the general living conditions at small and austere base camps. Effective PM is a key component of force protection, as well as an important piece of the Soldier's quality of life.

CONCLUSION

The practice of PM operations in a counterinsurgency environment remains very complex and is constantly changing. Innovative and more efficient solutions to PM concerns are always needed in the operational environment. Army transformation has certainly helped deliver better PM support to Soldiers on the ground. The decentralization of PM personnel, increased number of ESEOs, and addition of a field

grade staff ESEO in today's modularized division has paid tremendous dividends. In spite of these gains, the suggested doctrinal and personnel changes must be considered for optimal force health protection on today's nonlinear battlefield.

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Control of Concealing Vegetation Along Rural Routes in Iraq

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BACKGROUND

In support of Operation Iraqi Freedom (OIF) 06-08, a brigade combat team (BCT) assigned to Multi-National Division-Center was located in central Iraq, southwest of Baghdad. The BCT's operational environment consisted mostly of rural farmlands and villages. Fertile farmland and vegetation was relatively prevalent throughout the area due to the proximity of the Euphrates River, which supplies farms with water through irrigation canals. The irrigation canals historically have been vital to the livelihood of those who live in the area. The Common Reed (*Phragmites australis*) and the Giant Reed (*Arundo donax*) grow along roadsides adjacent to these irrigation canals.¹

Many of the primary and secondary canals parallel roads used as alternate supply routes by coalition forces to conduct patrol missions. Improvised explosive devices (IEDs) were the primary casualty-producing weapons of choice for insurgents against coalition forces during OIF 06-08. The majority of casualties occurred during mounted operations when Soldiers were traveling in armored vehicles along roads throughout the country. As shown in Figures 1 and 2, the reeds (14 to 20 feet tall in stands up to 30 feet wide) grow along the roadsides creating an alley-like effect that provides excellent concealment for insurgents to emplace and detonate IEDs with minimal risk of being observed, thus creating easy access and evasion routes. The reeds conceal IEDs from early detection by mounted patrols and also create limited visibility and fields of fire around rural combat outposts and patrol bases.

The increased IED risk associated with the vegetation was a constant critical threat to the BCT during counterinsurgency operations, especially during the establishment and support of remote patrol bases. As a result, removal of the reeds was a high priority for commanders throughout the BCT. The necessity for

vegetation control along rural routes will likely remain for future counterinsurgency operations and theaters of conflict.

TARGET SPECIES

Control of the vegetation along the rural routes throughout the BCT's operational environment was targeted primarily towards 2 specific reed species. Understanding the reproductive physiology of these target species is critical to implementing effective control measures.

The target reed species common to the central marshes in Iraq are *Phragmites australis* and *Arundo donax*.¹ They are large, perennial, rhizomatous grasses that are found on every continent except Antarctica and may have the widest distribution of any flowering plant.² The reeds are common in and near freshwater and brackish wetlands throughout the world's temperate zones. The reeds have a great affinity for growth along railroad tracks, roadside ditches, and slight depressions holding water, as they thrive through extensive water uptake. These perennials are known to live for three to six years.³

The reeds are typically the dominant species where they exist through formation of robust monocultures. They are capable of vigorous vegetative reproduction through underground rhizomes and often form dense, monospecific stands which can be over 30 feet in diameter. The plants generally flower and set seed between July and October.³ Despite the large quantities of seeds produced, most are not viable. Underground rhizomes are the primary means of reproduction. Following maturity and seed set, the majority of the nutrients are translocated back into the rhizomes (up to 6 feet in depth) and the aboveground portions of the plant die back for the dormant season.² In Iraq, nutrient translocation was observed to occur approximately in late November, with new, above-ground growth appearing in mid-March. As the



Figure 1. A typical example of the dense vegetation growth, including the Common Reed (*Phragmites australis*) and the Giant Reed (*Arundo donax*), along Iraq roadsides, which affords excellent concealment for insurgents to emplace and detonate roadside bombs.

nutrients translocate underground, the dead vegetation remains standing until the next growing season, providing year-round concealment.

VEGETATION CONTROL MEASURES IN OPERATION IRAQI FREEDOM 06-08

Throughout the overlapping periods that the authors were individually deployed to Iraq (September 2006 to June 2008), maneuver commanders considered the reeds to be a direct threat to Soldiers' lives, and took considerable measures to control them. Three methods of vegetation removal were used in the operating environment during this time frame: controlled burning, mechanical removal using roadside flail mowers, and manual removal by contracted local nationals.

The primary method of reed removal along alternate supply routes (ASRs) was through controlled burns conducted by military personnel as shown in Figure 3. Soldier safety was of paramount concern during the burn operations, and a division level safety standard operating procedure was created and implemented specifically for the controlled burn mission. Due to the high water content of the vegetation, the addition of an external fuel source was required to initiate and sustain the burn. The external fuel source usually consisted of a combination of JP-8 (aviation fuel) and gasoline,

which was sprayed on the reeds prior to ignition. This method was very effective for short term control, but was ineffective for sustained removal. Burning alone does not reduce the growth of reeds unless the roots burn, which seldom occurs because the rhizomes are usually covered by a layer of soil, mud, and/or water.⁴ Reed burns conducted at times other than late summer (when the majority of the plant's nutrients were above ground) resulted in reemerging stands with greater population densities.⁵ Ultimately, due to the inability of the controlled burns to destroy the reeds' rhizomes, repetitive burning missions over the same ASRs were necessary throughout the deployment.

Mechanical removal through cutting or mowing is another method of suppressing reed growth, but it is critical to perform the cut during the peak growing season in order to have a significant impact on reemergence of the reeds. The optimal time for mechanical removal is when most of the nutrient reserves are in the aerial portion of the plant, reducing its vigor upon cutting. Improper timing may increase stand density.⁶ As shown in Figure 4, the BCT operated flail mowers (nicknamed Razorbacks) that were mounted on armored trucks which allowed roadside cutting up to 15 feet from the base of the mower. This technique allowed Soldiers to remain within the armored vehicles while cutting reeds, but the equipment and technique received mixed reviews

Control of Concealing Vegetation Along Rural Routes in Iraq



Figure 2. Another example of dense reed growth alongside a rural road in Iraq.

from brigade support battalion and forward support company Soldiers with regard to its effectiveness. Repetitive missions over the same rural roadsides were again required throughout the deployment due to the lack of rhizome destruction.

Utilizing contracted local national workers for the manual removal of the roadside vegetation adjacent to their villages did not result in effective control. Using machetes and/or “weed whackers,” the workers attempted to remove the reeds from the roadsides. This method was much more time consuming than initially anticipated, and posed an increased threat to the workers’ physical well-being by those who used the reeds for IED concealment. The extended duration of initial removal was compounded again by the need for repetitive missions due to lack of rhizome destruction.

PROPOSED CHEMICAL VEGETATION CONTROL METHOD

Implementing a chemical vegetation control method in conjunction with physical removal methods mentioned above could help control reed growth throughout the reeds’ active growing season and improve route security. Use of a US Environmental Protection Agency (EPA) approved herbicide that

targets plants and is relatively nontoxic to humans and fish minimizes the risk to the local nationals and the environment of Iraq. The immediate benefit associated with this method towards the direct protection of human health from IEDs outweighs the relatively minor risk of any environmental impact potentially associated with elimination of this riparian zone vegetation. Procurement of the appropriate spray equipment could allow units to treat roadsides with chemical herbicides quickly under the supervision of Department of Defense (DoD) certified pesticide applicators, while reducing their exposure to enemy contact. However, presidential approval or an exception to policy of Executive Order 11850⁷ is required prior to the implementation of any method using herbicides.

The proposed technique for reed removal along rural routes is the implementation of an herbicide application method through use of a DoD approved pesticide and a right-of-way spraying system for the sustained control of reeds. The 2 necessary chemical components for the proposed chemical vegetation control method are an herbicide and a surfactant. The herbicide should be nonpersistent, nonselective, water-soluble, and designed to control the growth of herbaceous and woody plants. A surfactant is a combination wetting agent, activator, and penetrator; its mode of action breaks down the waxy cuticle on leaf surfaces, allowing herbicide penetration into the conductive tissue. The herbicide then flows throughout the plant (most importantly to the underground



Figure 3. Controlled burn of roadside reed growth using an external fuel source.

rhizomes and roots) for permanent destruction. Both chemicals are designed to biodegrade quickly and completely into CO₂, N, H₂O, and phosphates, resulting in little to no persistent effects on the environment.

For chemical dispersal along the ASRs, use of a right-of-way spraying system, such as those commonly used in the United States by state-level departments of agriculture and transportation, is recommended. These systems are built on steel frames and can be mounted easily on an armored military truck. Boomless hydraulic sprayers (10- to 30-ft spray distance) are controlled using an instrument panel inside the vehicle, affording maximum protection to Soldiers from direct fire and IEDs. Sprayers are powered by an internal engine and have attached polyethylene storage tanks, allowing up to a 500 gal capacity with jet agitation, which permits adequate treatment of long routes without the necessity to stop and remix. Additionally, 300-ft hoses with retractable reels are available to allow dismounted spraying around walls, fences, etc. Optimal application within the vehicle can occur at speeds of 7 to 10 mph, which is comparable to speeds typically used to travel along the edges of these roads allowing vigilance for signs of IEDs.



Figure 4. Flail mower mounted on an armored truck.

The combination of a controlled burn without an external fuel source following herbicide application, or roadside mowing prior to herbicide dispersal, could be effective in sustained weed removal along roadsides. A combination of prescribed burning after chemical treatment was reportedly successful along the east coast of the United States.^{4,8} The proposed chemical vegetation control method potentially could be

effective in persistent weed removal along roadsides and would pose minimal negative impact to the host nation. When considering the use of chemical methods for vegetation control, the potential environmental impact within local regions must be a factor of consideration, compared with the currently used methods.

Use of the above proposed chemical vegetation control method by the US military is restricted by Executive Order 11850: Renunciation of Certain Uses in War of Chemical Herbicides and Riot Control Agents, enacted on 8 April 1975, by President Gerald Ford. The following is an excerpt from Executive Order 11850:

The United States renounces, as a matter of national policy, first use of herbicides in war except use, under regulations applicable to their domestic use, for control of vegetation within US bases and installations or around their immediate defensive perimeters.... The Secretary of Defense shall take all necessary measures to ensure that the use by the Armed Forces of the United States of...chemical herbicides in war is prohibited unless such use has Presidential approval, in advance.⁷

Therefore, the ability to use commercially available, EPA-approved herbicides to mitigate the threat to US forces by improving the detection of IEDs along the rural roadways of Iraq is impeded by Executive Order 11850, issued 34 years ago.

In the aftermath of the attacks within the United States on September 11, 2001, and the start of the Global War on Terrorism, the nature of military operations has changed significantly for US forces. The primary threat towards Soldiers deployed to the US Central Command area of operations is not direct attacks on their defensive perimeters (where Executive Order 11850 allows the use of herbicides to reduce concealment), but rather through attacks on mounted patrols and convoys, and by IEDs emplaced along roadways. Due to the limitations placed on effective vegetation control by EO 11850, it is imperative that a review of EO 11850 be conducted to obtain either an exemption for the chemical control methods discussed above, or presidential approval for their use during current contingency operations. An exception to policy or specific presidential approval may increase the ability to effectively control vegetation along these roadways in order to increase force protection for the Soldiers.

Control of Concealing Vegetation Along Rural Routes in Iraq

CONCLUSION

Due to the global presence of *Phragmites australis*, *Arundo donax* and related species, there is potential for the situation presented herein to remain a recurring threat to deployed Soldiers as counterinsurgency operations continue throughout the world. The environmental science and engineering officers, working in conjunction with entomologists in theater, have the ability to assist commanders counter this threat by implementing measures that would minimize concealment of IEDs and those who emplace them,

thereby mitigating the risk to Soldiers. Force health protection personnel possess the tools necessary to aid commanders in reducing the vegetation associated risk through use of an environmental management alternative, but only if exception from Executive Order 11850 is obtained.

Controlling the vegetation will dramatically improve visibility along roadways, enhancing Soldiers' ability to better identify the IEDs prior to detonation. Better visibility and identification of IEDs along roadways will likely save Soldiers' lives.

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Fort Carson: An Army Hearing Program Success Story

CPT Leanne Cleveland, MS, USA

INTRODUCTION

The Army Hearing Program (AHP) is evolving from its predecessor, the Army Hearing Conservation Program (AHCP). The AHP strives to prevent noise-induced hearing loss during training and deployment operations without compromising combat effectiveness. In contrast, the older AHCP is a garrison-based model which worked well in peacetime, but fell short of the mark with the onset of Operations Enduring Freedom and Iraqi Freedom.¹ The failures of the garrison-based AHCP were well-documented by Helfer et al² who investigated the rates of noise-induced hearing loss among several audiology clinics in military treatment facilities across the Army. They found that Soldiers who had deployed to a combat zone showed exponentially higher rates of noise-induced hearing loss, acoustic trauma, permanent threshold shift, tinnitus, eardrum perforation, and H3 or H4 profile (defined in Table 1) compared to those who had not deployed. In accordance with *Army Regulation 600-60*,³ Soldiers with H3 and H4 hearing profiles are nondeployable pending adjudication by a retention board.^{3(p8)} Often, it is senior noncommissioned officers with prior combat experience who are reassigned to a non-noise-hazardous military occupational specialty (MOS) or separated from the Army because of their H3 or H4 profile. Thus, a largely preventable, noise-induced hearing loss deprives the Army of invaluable leadership for junior

Soldiers with less (or no) combat experience. Our national security depends on having well-trained Soldiers on the battlefield, and that is why the Army Hearing Program's growth, and growing pains, have involved much more than a name change.

The US Army Medical Command (MEDCOM) Automated Staffing Assessment Model for Preventive Medicine (ASAM PM) currently recommends one Army audiologist and 2.5 audiology technicians for every 18,000 Soldiers as a minimum staffing model.⁵ The ASAM PM model reflects the garrison-based AHCP, and is not compatible with the operational hearing services requirements of the new Army Hearing Program. In January 2008, Fort Carson received authorization for a second Army audiologist in preventive medicine as part of the AHP pilot study authorized by the MEDCOM Chief of Staff. This gave us a ratio of 2 Army audiologists and 5 audiometric/hearing health technicians for our approximately 18,500 Soldiers organic to Fort Carson (double what the current ASAM PM model recommends). The metrics presented in the following sections show that the latter ratio resulted in a higher number of Soldiers fit for deployment and a decrease in the amount of hearing loss at Fort Carson within units engaged in combat operations over the last calendar year. The data demonstrates how the ASAM PM model must evolve along with the new Army Hearing Program.

Table 1. Army Hearing Profiles^{4(p80)}

H1	Audiometer average level for each ear not more than 25 dB at 500, 1000, 2000 Hz with no individual level greater than 30 dB. Not over 45 dB at 4000 Hz.
H2	Audiometer average level for each ear at 500, 1000, 2000 Hz, or not more than 30 dB, with no individual level greater than 35 dB at these frequencies, and level not more than 55 dB at 4000 Hz; or audiometer level 30 dB at 500 Hz, 25 dB at 1000 and 2000 Hz, and 35 dB at 4000 Hz in better ear. (Poorer ear may be deaf.)
H3	Speech reception threshold in best ear not greater than 30 dB HL, measured with or without hearing aid; or acute or chronic ear disease.
H4	Functional level below H3

THE ARMY HEARING PROGRAM AT FORT CARSON

Fort Carson, located in Colorado Springs, Colorado, is quickly growing into one of the Army's largest Army Forces Command bases. Fort Carson currently has a population of approximately 18,500 Soldiers in garrison. Fort Carson's Soldier population is expected to grow to 29,000 by the year 2011 with the addition of 2 more brigade-sized elements. Fort Carson is also a primary projection platform: in addition to our own organic units, hundreds more Soldiers from the Army National Guard and from the Army Reserves are activated and demobilized from their deployments throughout the United States, Europe, and the middle

Fort Carson: An Army Hearing Program Success Story

east every year at the Fort Carson Soldier Readiness Processing Center.

As part of the drastic Army-wide military to civilian conversion of audiologist authorizations in the late 1990s and early 2000s, the Army audiologist authorization at Fort Carson disappeared in 2002, concurrent with the onset of Operations Enduring Freedom (October 2001) and Iraqi Freedom (March 2003).

Figure 1 shows that in 2003, the Fort Carson annual (permanent) significant threshold shift [a metric detailed on page 70] rate jumped from 12% to 16%. This reflects the large number of Soldiers who redeployed to Fort Carson from combat theaters with hearing loss. In June 2006, the authorization for an Army audiologist was reinstated under the Department of Preventive Medicine, and the Army Hearing Program was implemented.

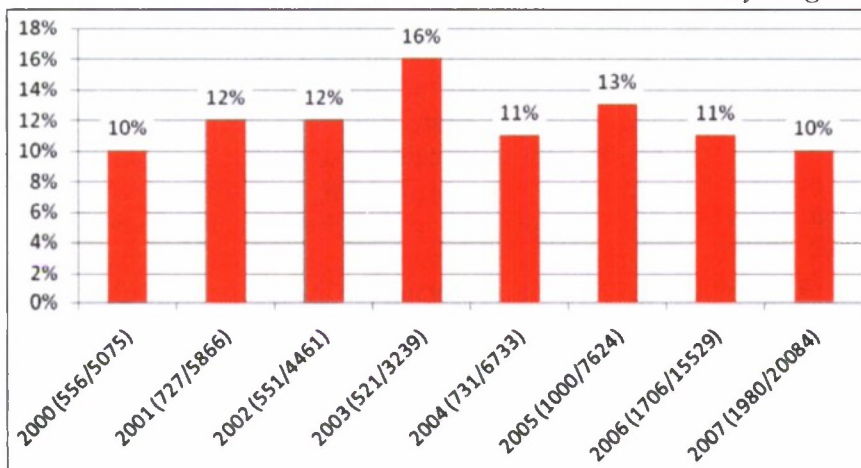


Figure 1. Percentage of tested Fort Carson Soldiers with significant threshold shift (STS) for the years 2000 through 2007.

Note: Numbers in parentheses – (number demonstrating STS/total number tested)

Consider for a moment why the current ASAM PM staffing model is impractical. The high number of Soldiers requiring clinical hearing services (diagnostic audiological evaluations) would prevent a sole audiologist from ever leaving the clinic. This means that there is no time available for the single audiologist to train medics and other noise-exposed military personnel on earplug fittings, no time to conduct annual hearing health briefings, and no time for inspections of noise hazardous areas. When preventive efforts are incomplete or nonexistent, the rates of hearing loss will perpetuate, which will further prevent the audiologist from working outside of the clinical demands.

Four elements comprise the Army Hearing Program:

- Hearing readiness
- Clinical hearing services
- Operational hearing services
- Hearing conservation

Although each element is distinct, the failure of one area will have a direct influence on the other three. A detailed explanation of the Army Hearing Program can be found in *Special Text 4-02.501: Army Hearing Program*.⁶

HEARING READINESS

Hearing readiness implies that Soldiers have the required hearing capabilities, personal protective equipment, and medical equipment for deployment to a combat zone. Required hearing capabilities are set by *Army Regulation 40-501*.⁴ Soldiers with H1 or H2

hearing profile (defined in Table 1) are deployable, provided there is no significant, underlying pathology of the outer, middle, or inner ear.

Every Soldier on Fort Carson is required to take an annual hearing test, a predeployment hearing test, and a postdeployment hearing test using the Defense Occupational and Environmental Health Readiness System–Hearing Conservation (DOEHRS-HC) audiometers. The DOEHRS-HC hearing profile data feeds into the Army Medical Department Medical Protection System (MEDPROS) medical readiness database, which assigns a

hearing readiness (HR) category (defined in Table 1) to each Soldier ranging from Class I to Class IV as shown in Table 2.

The Fort Carson Hearing Program (FCHP) tracks the HR status for all Soldiers on a monthly basis. Figure 2 illustrates 3 important facts:

- The hearing readiness “GO” rate has increased steadily since the addition of a second Army audiologist in January 2008.
- The number of Soldiers who are nondeployable (“NO-GO”) due to hearing loss has steadily decreased.

- The population of Fort Carson has increased by almost 3000 Soldiers from June 2007 (16,722) to December 2008 (19,140).

Compare this to Figure 1. In 2000, only 5,075 of Fort Carson's Soldiers received a DOEHRS-HC hearing test and earplug fitting. That number has nearly quadrupled in 8 years as a result of the HR category on MEDPROS.

Our goal is to continue to maintain a minimum of 80% of Fort Carson Soldiers at HR Class I or II. Looking at Figure 2, note how it appears we fell short of our goal of an 80% GO rate from August to November 2007. These numbers represent the Soldiers from the 2nd Infantry Division who were deployed in support of Operation Iraqi Freedom for 15 months. MEDPROS automatically identified many of those Soldiers as Hearing Readiness Class IV because they were overdue for their annual (12-month) hearing test. The next version of DOEHRS-HC will include an algorithm that takes into consideration the 15-month deployment cycle.

The FCHP emphasizes the importance of appropriate earplug fitting by qualified medical personnel at the Hearing Readiness Section, located at the Soldier Readiness Processing Center. Every Soldier seen for a hearing test is required to show their earplugs and demonstrate knowledge on how to properly insert them. If the Soldier does not bring earplugs with them on the day of testing, they are refitted by the hearing readiness audiology technicians at that time. The flowchart in Figure 3 illustrates the main processes followed by the hearing readiness staff at Fort Carson.

CLINICAL HEARING SERVICES

Clinical hearing services are required in both garrison and deployed settings. Although there is some overlap, the variance in services delivered between these 2 environments is

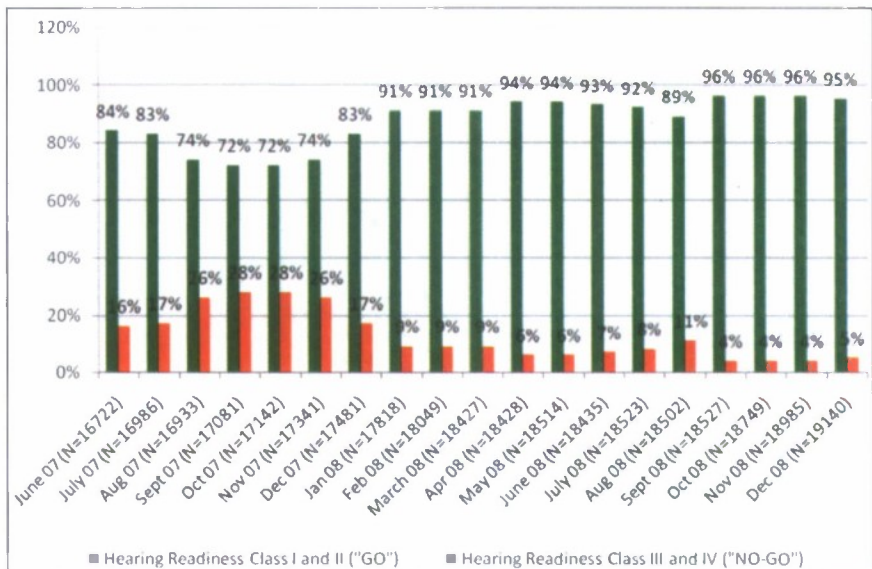


Figure 2. The monthly hearing readiness status of the Soldier population of Fort Carson for 2008.

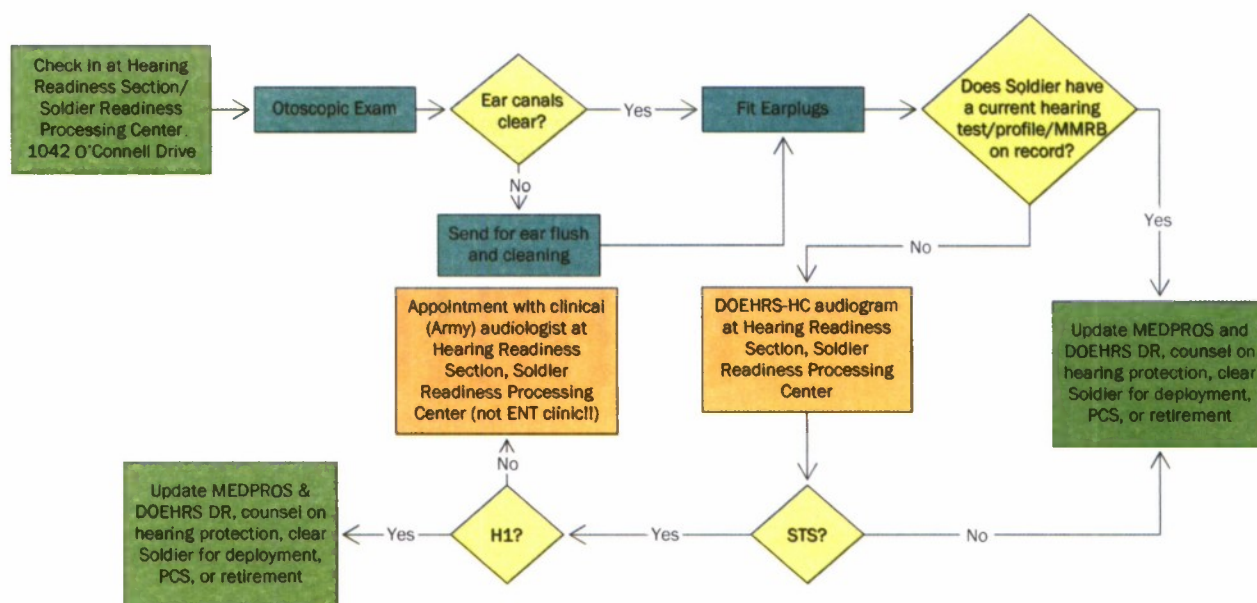
Note: Number in parentheses is total number of Soldiers on Fort Carson as shown in the MEDPROS database.

operationally driven. In garrison, comprehensive diagnostic audiological services are provided to Soldiers in HR Class III and IV status. Diagnostic audiology services include fitness for duty evaluations, hearing profiles for readiness, speech recognition in noise tests for Soldiers with H3 hearing profile, significant threshold shift follow-up, acoustic trauma injuries, and difficult to test patients (including Soldiers who attempt to feign or exaggerate hearing loss).

Table 2. Army Hearing Readiness Categories^{4(p114)}

CLASS I	Soldier's unaided hearing is within H1 standards for both ears. No corrective action is required.
CLASS II	Soldier's unaided hearing is within H2 or H3 standards. Soldier has a current hearing profile assigned (H2 or H3), and a completed Military Occupational Specialty Medical Retention Board (H3) with no active middle ear disease or medical pathology in the ear. If a Soldier wears hearing aids, he must have hearing aids appropriate for hearing loss and a six month supply of batteries. No corrective action is required.
CLASS III	Soldier's unaided hearing is within H2 or H3 standards. Soldier has a current hearing profile assigned (H2 or H3), and a completed Military Occupational Specialty Medical Retention Board (H3) with no active middle ear disease or medical pathology in the ear. If a Soldier wears hearing aids, he must have hearing aids appropriate for hearing loss and a 6-month supply of batteries. No corrective action is required.
CLASS IV	Soldiers who do not have a DOEHRS-HC audiogram in their medical record within one year. Soldier requires a hearing examination. This includes Soldiers without a reference baseline audiogram or whose last periodic audiogram is greater than one-year old. Hearing readiness classification is unknown.

Fort Carson: An Army Hearing Program Success Story



Notes:

For all cases of Soldiers reporting acute hearing loss, or suspected active pathology (TM perforation or bulging TM, or suspected malingering), contact the military audiologist at the Hearing Readiness Clinic to book an appointment so that the condition can be confirmed.

ALL SOLDIERS MUST come through Hearing Readiness first. The HR technicians will refer to the Army Audiologists if required.

DO NOT book Soldier appointments with the civilian Audiologist in the ENT clinic.

DO NOT book a Soldier appointment with an ENT physician without going through Hearing Readiness first.

Figure 3. The hearing readiness screening process for all Fort Carson Soldiers as implemented by the Fort Carson Hearing Program.

In deployed settings, hearing injury treatment services may be provided within the confines of the combat support hospital. The primary purpose of diagnostic hearing care in theater is to determine a Soldier's fitness for duty status and to ensure that only Soldiers in need of advanced audiological care are evacuated out of theater.

The significant threshold shift (STS) criteria is a familiar metric used to document trends over time, and we believed it to be the most appropriate tool to evaluate hearing loss trends and our clinical hearing services at Fort Carson. STS is calculated by averaging the patient's hearing thresholds at 2000 Hz, 3000 Hz and 4000 Hz. If the change from the reference (baseline) audiogram is greater than or equal to +10 dB, a positive STS is recorded.

Referring to Figure 1, note that the Fort Carson STS rate in 2002 was equivalent to the Army average STS rate of 12%. In 2003, the STS rate increased to 16%. We believe the increase is the result of 2 factors:

- The initial group of Soldiers who were deployed to the first cycle of Operation Iraqi Freedom did so without the combat arms earplugs which are

currently a rapid field initiative issue to all deploying Soldiers. The combat arms earplugs (CAE) allow low level sounds such as speech to pass through unimpeded. The nonlinear filter in the CAE dampens high level impulse noise such as weapons fire. As with all earplugs, proper size and fit are crucial. During the initial deployments for the global war on terror, the CAE and conventional earplugs for Soldiers were often not available, not wanted, or not fitted properly, which resulted in the dramatic STS increase in 2003.

- The elimination of the Army audiologist's authorization from Fort Carson in 2002 resulted in the abandonment of key concepts, such as hearing loss prevention education and the emphasis on hearing protection devices and their proper use. Generation of relative value units (RVUs) in a clinical audiology setting was the only outcome measure used by the command at that time.

Figure 1 also shows how the Fort Carson Soldier STS rate decreased to 10% (on average) during calendar year 2007. Figure 4 shows a breakdown of calendar year 2008 and a current average STS rate of less than 11%. This represents the lowest rate of STS on Fort

Carson since the year 2000 when we were a peacetime Army. The high STS rates in August 2008 (14%) and in December 2008 (15%) are outliers, and reflect a lack of compliance with the hearing program for 2 units undergoing predeployment hearing readiness evaluations compared to similar units at Fort Carson. Even with the outliers, however, the data in Figure 4 demonstrates that the implementation of the Army Hearing Program at Fort Carson has reduced the Soldiers' overall STS rate to less than 11% during a period of continuous active combat deployments. Eliminating the 2 outliers from the post average puts the rest of Fort Carson's STS rate at less than 10%.

A civilian audiologist works in the Ear, Nose and Throat (ENT) Clinic as part of the Fort Carson Hearing Program. The civilian audiologist's main role is to provide diagnostic audiology services to TRICARE* eligible family members, dependents and retirees. Under the Army Hearing Program at Fort Carson, the civilian audiologist only sees Soldiers who are referred by one of the active duty Army audiologists, or by one of the ENT physicians. The civilian audiologist's responsibilities for Soldier care include clinical rehabilitative services (such as dispensing hearing aids), or advanced clinical testing (including electrophysiological tests and vestibular tests). The civilian audiologist also runs the newborn hearing screening program in the hospital and provides diagnostic and rehabilitative care for TRICARE eligible family members.

It is crucial to distinguish the very different role that the civilian clinical audiologist in the ENT or department of surgery has from the active duty Army audiologist (aligned under the department of preventive medicine). Those audiologists' roles are entirely clinical and rehabilitative in nature, and their patient population consists primarily of civilians. Conversely, the active duty preventive medicine audiologist's role is only 50% clinical in nature. The other 50% of the time is preventive and spent outside

of the clinic, involved in education and site inspections. Their primary mission is the prevention of noise-induced hearing loss and the improvement of hearing readiness, in the hope that a hearing aid is not required for as many Soldiers in the future. The preventive medicine audiologist's patient population consists almost entirely of Soldiers. Figure 5 illustrates the different clinical hearing services missions of the preventive medicine (active duty) and the ENT (civilian) diagnostic, clinical, and rehabilitative care.

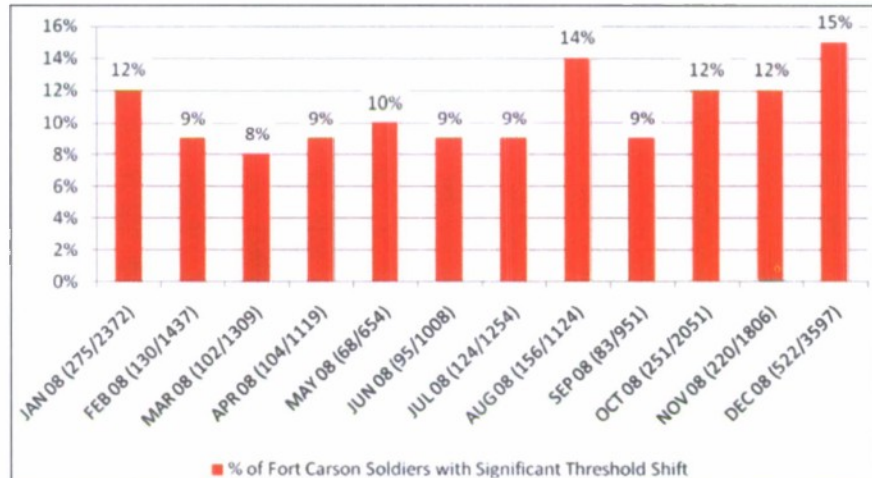


Figure 4. Percentage of tested Fort Carson Soldiers with significant threshold shift (STS) for each month of 2008.

Note: Numbers in parentheses – (number demonstrating STS/total number tested)

OPERATIONAL HEARING SERVICES

We believe the reduced STS rate at Fort Carson is a direct result of our focus on operational hearing services in the Fort Carson Hearing Program. The primary objective of operational hearing services is the enhancement of Soldier survivability. Hearing is a critical sense that directly affects mission success. The ability to hear in a combat environment is critical because normal hearing allows a Soldier to detect the enemy and maintain effective communication ability and situational awareness in noise. Operational hearing services include education and instruction in tactical communication and protection systems (TCAPS), noise surveillance of hazardous and nuisance noise environments, guidance on noise abatement and control, and emphasis on prevention of hearing injuries through education and readiness to maximize the warfighter lethality and survivability on the battlefield, without compromising communication and situational awareness. Commanders enhance their units' effectiveness by ensuring troops are equipped with proper hearing protection and/or TCAPS.

*TRICARE is the DoD health care program for members of the uniformed services, their families, and their survivors. Information available at <http://www.tricare.mil>.

Fort Carson: An Army Hearing Program Success Story

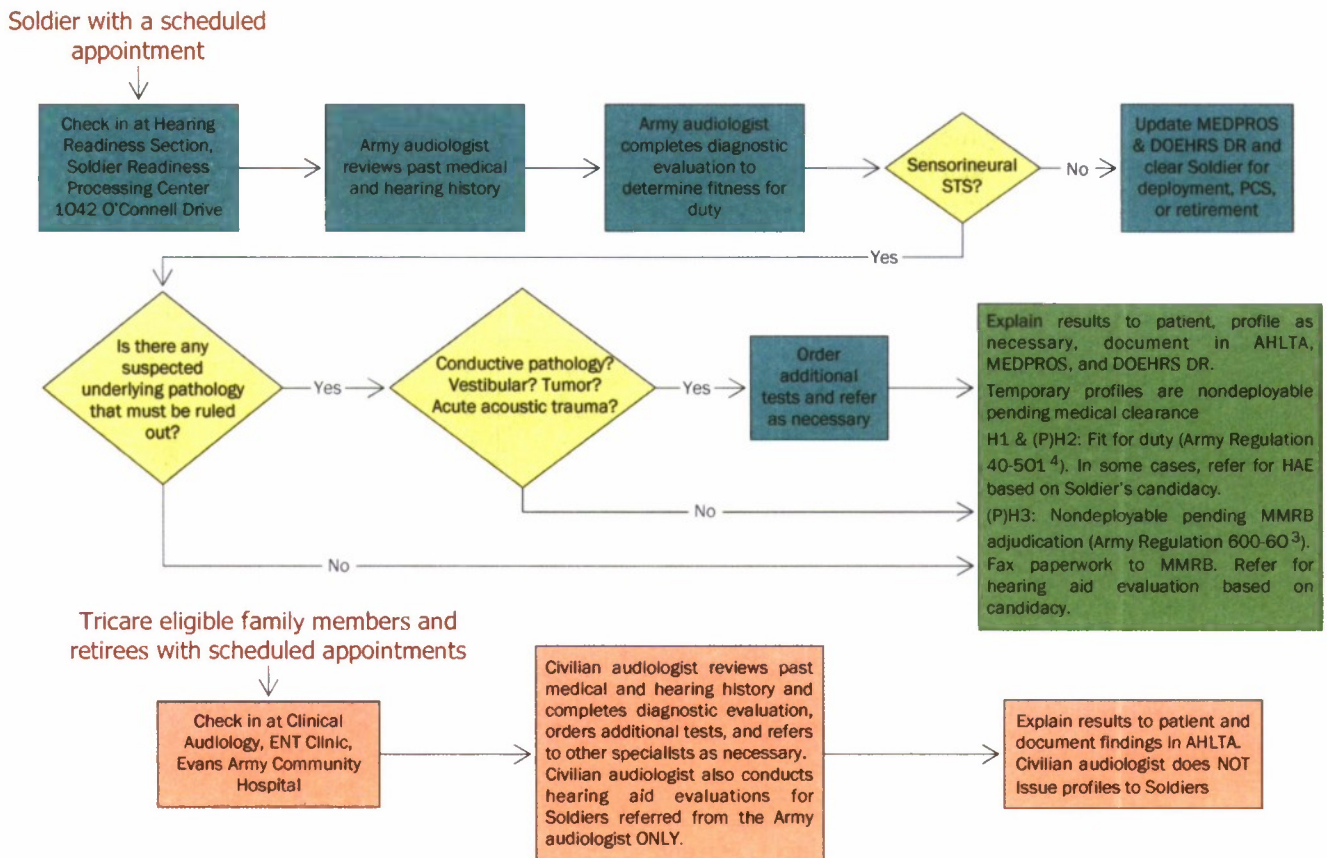


Figure 5. The 2 distinct processes for clinical hearing services for Soldiers and others at Fort Carson. Soldier care is the exclusive responsibility of the Army audiologist, who can make a necessary referral. Patients who are not Soldiers are seen by the civilian audiologist through the ENT clinic at the Evans Army Community Hospital.

Commanders must ensure their units are provided the opportunity to train with these devices and understand their use and importance in maintaining effective communication and situational awareness.

The metrics we developed monitor operational hearing services in garrison, with the intent that Soldiers will “fight as they train,” and transfer the training and skills they learned in garrison onto the battlefield. We followed guidance from the *Department of the Army Pamphlet 40-501*, which states that commanders of noise-exposed personnel must appoint a unit hearing conservation officer.⁷ We incorporated this requirement into a post-wide standing operating procedure (SOP), which was endorsed by the Fort Carson installation commander. The SOP states that each unit on Fort Carson is required to formally appoint a company level hearing program officer (HPO). Each HPO must complete a half day of training under the supervision of at least one of the FCHP Army audiologists. The first portion of the class

explains the 4 elements of the hearing program, and the HPO’s role as extensions of the FCHP core staff. The second portion of the class involves several practical exercises including: examination of the outer ear canal with an otoscope; determination of the proper size earplug for both themselves and their fellow Soldiers; understanding noise reduction ratios; and understanding that not all earplugs are equally protective—some may in fact “over-protect.” Attenuation of too much ambient noise could cause a Soldier to reject all hearing protection based on a negative experience with one type.

Each HPO must pass a written and a practical examination. Graduates are issued a certificate of completion and a pocket otoscope, which becomes property of their company when the Soldier leaves the unit. HPOs are expected to arrange for their unit to participate in an annual hearing health briefing from one of the FCHP preventive medicine audiologists. HPOs are also expected to be ready for a site visit to

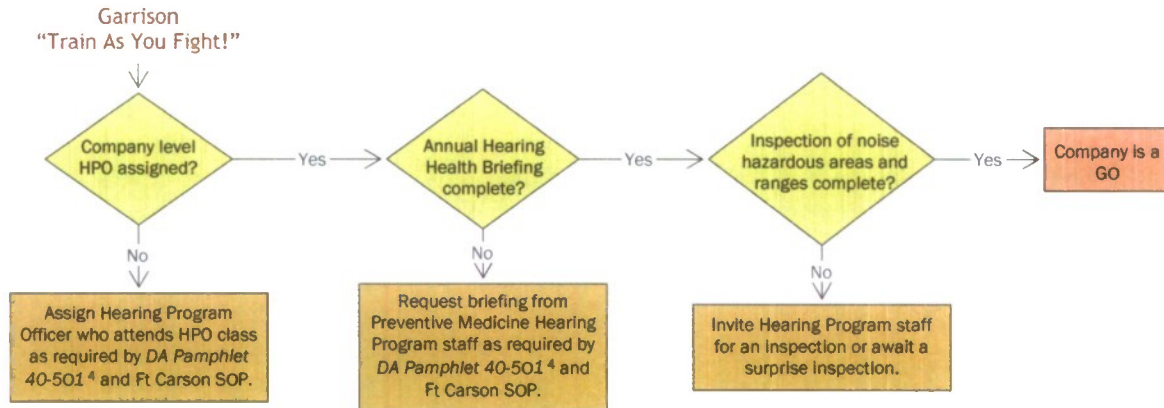


Figure 6. Operational hearing services provided under the Fort Carson Hearing Program.

their area from the FCHP staff to ensure their compliance with the hearing program. The flowchart in Figure 6 illustrates the 3 branches of the operational hearing services mission in garrison at Fort Carson.

Figure 7 shows that the FCHP has trained 321 company level hearing program officers in the last 2 calendar years. In so doing, we exceeded our goal of training an HPO for 222 (80%) of the companies on Fort Carson. Unfortunately we have fallen short of our other goals for operational hearing services in the areas of education and inspections. We had hoped to present an annual hearing safety briefing to the same 222 companies, but only managed to provide 15 company level hearing health briefings. We also failed in our goal to inspect noise hazardous areas for the same 222 companies, only 14 noise hazardous areas were

inspected over the last 2 years. We believe this shortfall was due to the deployment of one of our active duty audiologists to Iraq for 120 days, and her residency training at the Captain's Career Course for another 9 weeks in 2008. During her absence, the table of distribution and allowances* showed that Fort Carson had 2 uniformed audiologists on post running the hearing program, while in reality; only one person was available for more than half of the 2008 calendar year. These numbers further support our belief that the preventive medicine staffing model is inaccurate in its estimation that one military audiologist and 2.5 audiology technicians are capable of providing adequate preventive measures for every 18,000 Soldiers under the Army Hearing Program. Using the old staffing model with the new AHP sets Army audiologists up for failure.

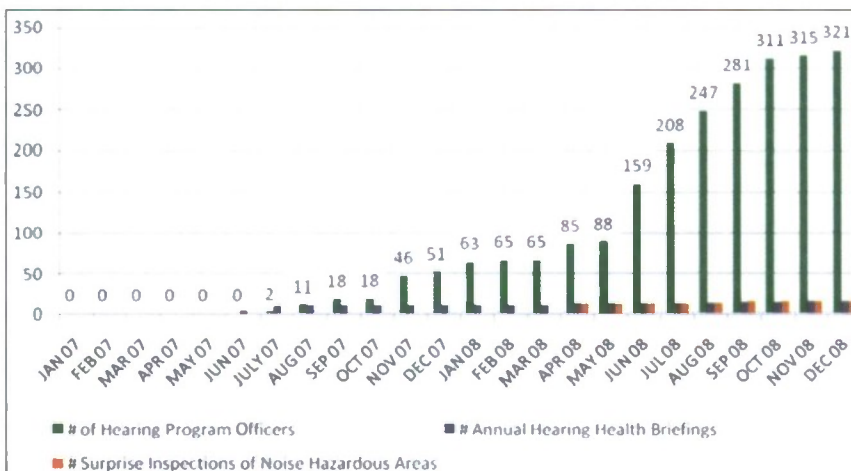


Figure 7. The cumulative number of trained, company level hearing program officers in Fort Carson units, the number of hearing health briefings presented, and the number of noise inspections performed shown on a monthly basis for 2007 and 2008.

HEARING CONSERVATION

The fourth element of the FCHP is hearing conservation. The hearing conservation element is designed to protect noise-exposed government civilian personnel employed at Fort Carson from hearing loss due to occupational noise exposure. This element follows the garrison-based Army Hearing Conservation Program, but applies to noise-

*Prescribes the organizational structure, personnel and equipment authorizations, and requirements of a military unit to perform a specific mission for which there is no appropriate table of organization and equipment.

Fort Carson: An Army Hearing Program Success Story

exposed civilians only, and does not include our Soldier population. There are 7 essential elements included in the hearing conservation component of the FCHP:

- Noise hazard identification
- Engineering controls
- Hearing protectors
- Monitoring audiometry
- Health education
- Enforcement
- Program evaluation

Figure 8 shows the annual STS rate for our noise-exposed civilian employees who are enrolled in the Hearing Conservation Section of the Occupational Health Clinic under the FCHP and the Department of Preventive Medicine. Although we track the overall STS rate monthly, we only graph the yearly percentage of STS due to the significantly lower number of civilians enrolled (411 total in 2008). In 2000, 30% of the 128 noise-exposed civilians on Fort Carson showed an annual significant threshold shift. The STS rate for our civilian workforce in 2008 has dropped to 6%, the lowest it has been in more than 8 years, even though the number of civilians tested has more than tripled during the same time period. We contribute our successes to increased interaction with the range control office on Fort Carson. The FCHP is involved in range control's training classes for range safety officers. We do not require the civilian population to participate in the Hearing Program Officer Course, but interestingly, several noise-exposed civilians have learned of our class and asked to participate so that they could assume the responsibility as the hearing program officer for their work area. Of course we have been happy to oblige and accommodate them in our classes.

CONCLUSION

The Fort Carson Hearing Program has documented metrics which show the new Army Hearing Program doctrine successfully decreased this post's Soldier and civilian STS hearing loss rate to levels predating the Global War on Terror, while we have been an Army at war. Additionally, the data shows that the addition of a second Army audiologist in calendar year 2008 resulted in an increase of more than 3,000 Soldiers who were fully ready to deploy, compared to calendar year 2007. Our success is attributed to an increased emphasis in operational hearing services, even though we fell short of our goal of providing a full spectrum and triad of operational hearing services to 80% of Fort Carson's companies in garrison. The FCHP metrics show positive trends in all 4 elements: hearing readiness, clinical hearing services, operational hearing services, and hearing conservation. The metrics also suggest that the Army Medical Command's preventive medicine staffing model's current recommendation of one audiologist and 2.5 technicians for every 18,000 Soldiers is insufficient and predestines hearing loss prevention efforts for failure. Finally, the FCHP shows that command emphasis is crucial for a successful hearing program. COL Kathy Gates, Audiology Consultant to The Surgeon General, succinctly states the current reality:

The Army no longer needs to accept hearing loss as an inevitable byproduct of military service.

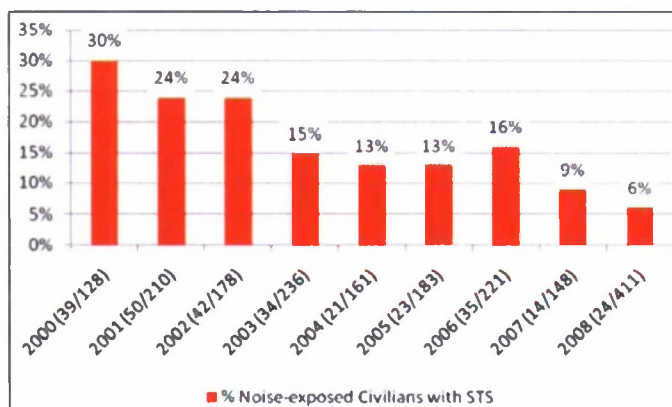


Figure 8. Percentage of noise exposed civilian employees who are enrolled in the Hearing Conservation Section of the Occupational Health Clinic with significant threshold shift (STS) for the years 2000 through 2008.

Note: Numbers in parentheses - (number demonstrating STS/total number tested)

ACKNOWLEDGEMENTS

I thank the following people for their assistance in preparation and review of this paper:

COL Kathy Gates, Audiology Consultant to The Surgeon General and Director of the Army Audiology and Speech Center at Walter Reed Army Medical Center.

COL James Terrio, Chief of Preventive Medicine at Evans Army Community Hospital, Fort Carson.

LTC Vicki Tuten, Audiology Staff Officer, Proponency for Office of Preventive Medicine, Office of The Surgeon General.

LTC Nicholas Piantanida, Deputy Commander for Clinical Services, Evans Army Community Hospital, Fort Carson.

Dr Kenneth Stone, MD, Chief of the Occupational Health Clinic, Department of Preventive Medicine, Evans Army Community Hospital, Fort Carson.

CPT Jenny Davis, Hearing Program Audiologist, Occupational Health Clinic, Department of Preventive Medicine, Evans Army Community Hospital, Fort Carson.

Ms Janet Klieman, Medical Librarian at Evans Army Community Hospital, Fort Carson.

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US Army Medical Department Activity
Fort Carson, Colorado

Establishing a Base Camp Assessment Program for a Forward Operating Base

CPT Davin Bridges, MS, USA
LTC Timothy Bosetti, MS, USA

ABSTRACT

Occupational and environmental health hazards can seriously impact the mission and erode public confidence in the military's ability to protect US personnel. With any forward operating base, it is critical to establish a comprehensive base camp assessment program to optimize health readiness and protect deployed Department of Defense personnel from occupational and environmental health hazards. It is an ongoing, never-ending duty to educate and perform sanitary inspections as well as water, soil, and air surveillance. Establishing a base camp assessment program for a forward operating base is critical to ensure continuous monitoring when the location does not have a permanent environmental science officer or preventive medicine specialist onsite. The specific goal of the base camp assessment program is to reduce disease and nonbattle injury. Lessons-learned have shown the importance of accurate reporting and interpretation of environmental health assessments to reduce disease and nonbattle injury.

BACKGROUND

Historically, 80% of all hospital admissions have been from disease and nonbattle injuries.¹ Preventive medicine measures are simple, common sense actions that any service member can perform and to which every leader can subscribe. In the preventive medicine world, there have always been difficulties ensuring the safety of geographically separated Soldiers. During Operation Joint Endeavour in 1995, base camp assessment teams were established to evaluate quality of life at forward operating sites in Bosnia. Currently, we have Soldiers located in many parts of the world, eastern Europe, the middle east, southwest Asia, and in the Balkans. The names change, but the basic concept of a base camp assessment team remains the same—and is always applicable.

It is easy when an entire brigade combat team is on a single forward operating base, but what do you do when there are many forward operating bases? For example, while deployed to Afghanistan in 2006 for Operation Enduring Freedom, my brigade was dispersed over 12 geographically separated forward operating bases. Since you cannot be everywhere at one time, how do you prevent mission failure due to environmental health issues? There must be a program to organize a systematic, holistic approach to plan, develop, implement, and maintain environmental

health surveillance at these forward base camps. That program is the base camp assessment program. Implementation of a base camp assessment program begins prior to arrival in-theater.

BASE CAMP ASSESSMENT PROGRAM

The 2 main references that form the basis of an environmental health surveillance program are *Department of Defense Instruction 6490.03*,² and Joint Chiefs of Staff *Memorandum MCM 0028-07*.³ These documents define environmental health surveillance as the regular or repeated collection, analysis, archiving, interpretation, and dissemination of data related to deployment occupational and environmental health. The base camp assessment program uses environmental health surveillance data for health monitoring, the determination of potential health hazard impact on a population or individual personnel, and for the timely intervention to prevent, treat, or control the occurrence of disease or injury when determined necessary.^{2,3} This is the starting point.

*Department of the Army Pamphlet 40-11 (DA PAM 40-11)*⁴ defines the programs and services within the medical functional area of preventive medicine. All preventive medicine Soldiers should read this pamphlet to identify US Army publications that delineate functions and contain the detailed

instructions, guidance, and procedures necessary for implementing the policies and responsibilities outlined in *Army Regulation 40-5*.⁵

At this point many will say, "those are garrison programs, I am in the field." While it is true that these are predominately garrison-based programs, they should not be excluded. Where better to find out what you can and should be doing than by mirroring an established garrison-based program. Train as you fight. *DA PAM 40-11*⁴ outlines all of the environmental health programs included in a base camp assessment program. It is more than just checking trash cans and sniffing latrines.

OVERVIEW

The base camp assessment is the key in an active preventive medicine program; however, there needs to be a clear understanding of the purpose of the base camp assessment program. The program is the assessment of the overall health status of Soldiers. The program should be flexible enough to meet the continually evolving needs of the Soldier and to accommodate the operation and changes in patterns of disease and injury. The goal of the program is to develop a comprehensive preventive medicine program to reduce disease and nonbattle injury through proactive measures.

COMPONENTS OF THE PROGRAM

Using *DA PAM 40-11*⁴ as a guide, a base camp assessment program can comprise many components. The individual components will vary depending on the forward operating base and the maturity of the theater. Typically, a base camp assessment program will consist of water surveillance, food service inspections, living area inspections, waste disposal, pest management, climatic injury prevention, and basic camp sanitation inspections. But it need not be limited to these (Figure 1). As the camp and theater mature, some programs will become routine, while others will emerge as greater risks. This may sound like a daunting task and one that is beyond the scope of a small preventive medicine cell within a brigade combat team. However, it is what you already do. The base camp assessment just brings it all together.

COMPREHENSIVE ASSESSMENTS: A HOLISTIC APPROACH

Development of a base camp assessment program for a forward base camp should follow a holistic approach. Focusing on a few individual components will not be sufficient in establishing a successful base camp assessment program. It needs to address the full spectrum of preventive medicine programs. A key to a successful base camp assessment program involves linking together what you already do, as illustrated in Figure 2. The problem is that we typically do not look at these programs on a continuum. Instead, we approach them as individual stovepipes and miss or overlook the warning signs. Typically, it is only after an outbreak or an increased incidence of disease that we start looking at the different environmental health programs holistically.

Sickness can come faster than you can anticipate. Being proactive with your preventive medicine duties is essential in stopping a possible mission failure. Something as simple as Soldiers not washing their hands could have a catastrophic effect on a platoon. Highlighting this simple failure as the starting point for an example of the spread of infection/disease/illness: a Soldier acquires gastrointestinal disease, he/she

- Water Supply
- Food Service Sanitation
- Troop Billeting/Sleeping Area
- Waste Disposal
- Pest Management
- Noise Hazard Identification & Control
- Field Sanitation Teams
- Barbershop Sanitation
- Heat Injury Prevention

Figure 1. Typical components of a base camp assessment (list not exhaustive).

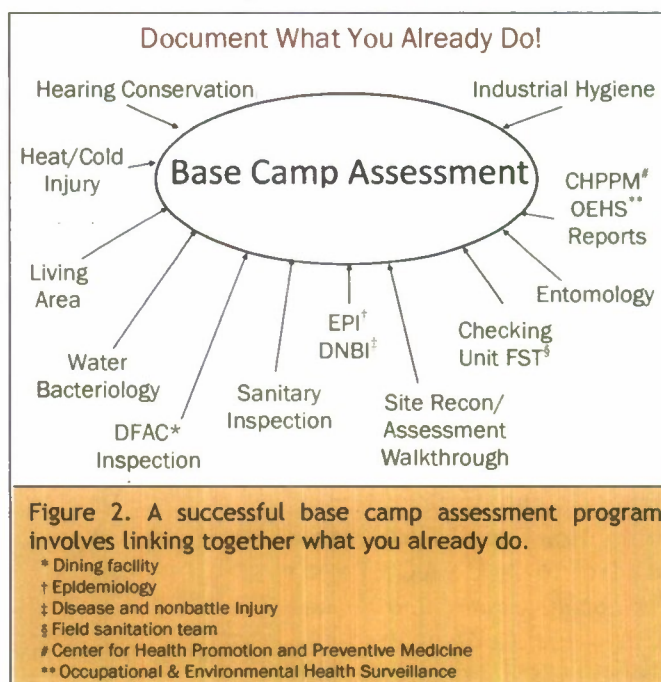


Figure 2. A successful base camp assessment program involves linking together what you already do.

Establishing a Base Camp Assessment Program for a Forward Operating Base

could easily spread that illness to all his/her fellow Soldiers by playing cards. If the platoon is ineffective because of sickness, the mission will suffer. This could have a domino effect that could impact the battalion. The break in the preventive medicine measures chain can put other missions on hold. It is our job not only to get the word out to the Soldier, but also to ensure the Soldier is practicing his/her preventive medicine measures.

A proper base camp assessment program attempts to tie the different preventive medicine and environmental health programs into a single assessment. The aim is to be proactive. To do this, we need to look at the second and third order effects of the individual findings. Then ask ourselves if any of them are related. Do the less than satisfactory sanitation practices in the dining facility, no chlorine residual, and a slight increase in sick call numbers have anything in common? Is it a sign of a bigger problem? These are some of the questions we should ask ourselves when we look at this holistically.

COMPOSITE RISK MANAGEMENT

The actual assessment portion of a base camp assessment requires the use of the information collected from your findings to identify hazards, assess the potential risks, determine appropriate risk control measures, and communicate the risks to the forces using composite risk management (CRM), graphically portrayed in Figure 3. Hazard severity is a measure of the impact of the interaction of the health hazards on Soldiers. Hazard probability is determined by estimating the percentage of the population that could be exposed to that hazard. Finally, the overall health risk estimate is determined by using the CRM matrix in Table 3-3 of the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) *Technical Guide 230*⁶ and *Army Field Manual 5-19*.⁷ Using CRM doctrine will

enable you to convey your message in a clear and universally understandable language: green, amber, red, and black. After determining the health risk, set in place a risk communication plan to deliver key messages of the health risk and the recommendations to lower the risk.

COMMUNICATION

Communication consists of 3 key components: document (eg, report), inform, and archive (Figure 4).

Documentation of everything is not only critical for presenting accurate results to your chain of command, it is essential for future missions. Having great documentation can effectively help the next preventive medicine team that follows you, and retains complete, accurate records of your findings and recommendations. Document the negative and the positive findings, and, keep your findings straightforward so that higher leadership will understand. The report does not need to be complex or a lengthy dissertation: keep it simple. Use an executive summary for the senior commanders and staff. Ideally, it should be a one-page snapshot of your work. Graphics are good. The report should be detailed enough to paint a picture of the health status of your forward operating base. If you have the capability,

include all of your inspection forms as enclosures. Document negative findings; if you looked at something and found nothing, state it. It is important to note when everything was okay. We in preventive medicine do not do a good job in this area. We are very good about documenting when we see deficiencies, but fail to properly record and report when everything was satisfactory.

Keep your command informed. Routine reporting of your base camp assessment to your command keeps them apprised of the preventive medicine "health" of their command and they will come to expect to see your report. It is not whom you include, it is whom you leave

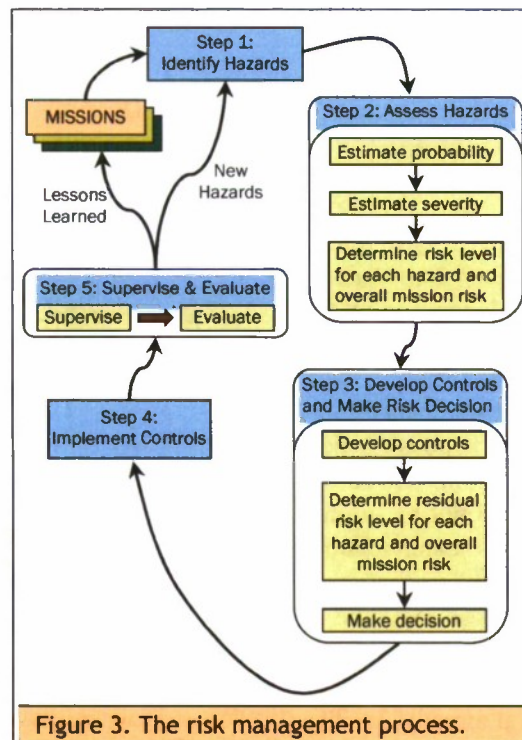


Figure 3. The risk management process.

out. Inform critical personnel, key staff, and commanders on a regular basis. Document and keep records of whom you inform.

Archiving the base camp assessment reports is important. All of your inspection forms and reports should be archived by submitting directly to the Defense Occupational and Environmental Health Readiness System data portal.* Use historical data for that specific site to develop an environmental health surveillance program for a specific forward base camp. Contact USACHPPM† to receive information on that site/location, using the Global Threat Assessment Program.

SOME TACTICS, TECHNIQUES, AND PROCEDURES

Putting prevention into practice is not always easy. Inspect, monitor, and record all documents for dining facilities, barbershops, gymnasiums, detention cells, food establishments, and water storage containers to ensure the safety of the Soldiers. There are a number of ways to accomplish this mission, here are a few tips:

1. Know doctrine and the regulations backwards and forwards. If you know doctrine, you will know when to follow it and when to modify it according to your situation. Remember, doctrine is a starting point. Likewise, regulations can assist you in knowing what you need to do.
2. Establish field standard operating procedures and smart-book checklists **before** you deploy. Test your program in garrison, what better way to run a battle drill and get your command familiar with your reports and preventive medicine. Use historical data for that specific site to develop your base camp assessment program for a specific forward base camp. Contact USACHPPM† to obtain information on that site/location, using the Global Threat Assessment Program.
3. Do not settle for the status quo. Once you have established the basic programs and they are running smoothly, expand those programs. Increase the level of expectation as facilities and support services increase their ability to provide safer, better quality services. If contracted

*<http://doehrswww.apgea.army.mil/doehrs-oehs/>

†email address: chppm-gtap@amedd.army.mil

COMMUNICATION

Document

Report
Document negative findings
Executive summary (keep it simple)

Inform

Keep base camp & task force commanders informed
Set routine schedule/timeline for report
Get involved

Archive Data and Reports

Submit directly to DOEHRs data portal
<https://doehrswww.apgea.army.mil/front.htm>
Submit via email
Unsecured - oehs@apg.amedd.army.mil
Secured - oehs@usachppm.army.smil.mil
Submit via regular mail
USACHPPM Attn: MCHB-TS-RDD
Bldg E-1675
5158 Blackhawk Road
Aberdeen Proving Ground, MD 21010-5403

Figure 4. The elements of a risk communication plan.

services are used, be sure you coordinate actions through the contracting office.

4. Be an evangelistic preventive medicine Soldier. You should be getting out and reaching out to all. Everyone should know you. During meetings, have a "tip of the week" for your commander. Get out and go to every meeting. Be around at all times. No matter what types of questions they ask, they still know who you are. These managers want to do what is right. Helping them succeed means you have a better chance to succeed in your preventive medicine mission. In addition, develop personal working relationships with the mayor's cell, base camp commander, and the contracting office on the forward operating base.

CONCLUSION

The base camp assessment is not another rock in your rucksack; it is a holistic approach to preventive medicine that enables you to interconnect the inspections you routinely do in order to gauge the overall health and sanitation of your forward operating base. It is what you already do: just a different approach to packaging the findings. Use this collection of data to lower the possibility of mission failure and maximize the fighting strength. Have an established base camp assessment program for forward base

Establishing a Base Camp Assessment Program for a Forward Operating Base

camps to monitor all aspects of preventive medicine. The program is dynamic and must readily change and adapt as Soldiers and missions change. The overall result of a successful base camp assessment program for forward base camps is lower numbers of casualties due to disease and nonbattle injury.

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Army Force Health Protection: Past, Present, and Future

E. Wayne Combs, PhD, RN

ABSTRACT

Following the 1990-1991 Persian Gulf War, many service members reported health problems and believed these problems were associated with their military service in the Persian Gulf. A paucity of health and deployment data severely limited the ability to investigate the nature and causes of these illnesses. Based on the findings from a 2002 study, the Government Accounting Office recommended that the Secretary of Defense direct the Assistant Secretary of Defense for Health Affairs to establish an effective quality assurance program that would help ensure that the military services comply with the force health protection and surveillance requirements for all service members. In November 2003, The Surgeon General of the Army tasked the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) with the development of a Deployment Health Quality Assurance Program for the Army. Since 2003, a team from USACHPPM has visited approximately one Army installation per quarter. Over time, there has been remarkable improvement noted in Army deployment health metrics and practices.

HISTORICAL BACKGROUND

Following the 1990-1991 Persian Gulf War, many service members reported health problems and believed these problems were associated with their military service in the Persian Gulf. A paucity of health and deployment data severely limited the ability to investigate the nature and causes of these illnesses. The National Defense Authorization Act for Fiscal Year 1998,¹ enacted in November 1997, directed the Department of Defense (DoD) to establish a system to assess the medical condition of service members before and after deployments. In 2002, the Government Accounting Office (GAO) was asked to determine if the military services met DoD's force health protection and surveillance requirements for service members deploying in support of Operation Enduring Freedom in central Asia and Operation Joint Guardian in Kosovo, and if DoD had corrected problems related to the accuracy and completeness of databases reflecting which service members were deployed to certain locations.

The findings of this GAO study were published in September 2003.² The GAO found that the Army and the Air Force did not comply with the DoD's force health protection and surveillance policies for many active duty service members, including the requirement that they be assessed before and after deploying overseas, that they receive certain immunizations, and that health-related documentation be maintained in a centralized location. The GAO's review of 1,071 service members' medical records

from a universe of 8,742 at selected Army and Air Force installations participating in overseas operations disclosed that:

- From 38% to 98% were missing one or both of their health assessments.
- From 14% to 46% were missing at least one of the required immunizations.

The study² also found that the DoD did not maintain a complete, centralized database of service members' medical assessments and immunizations. Health-related documentation missing from the centralized database ranged from 0% to 63% for predeployment assessments, 11% to 75% for postdeployment assessments, and 8% to 93% for immunizations. Additionally, there was no effective quality assurance program at the Office of the Assistant Secretary of Defense for Health Affairs or at the Army or Air Force that helped to ensure compliance with policies. The GAO believed that the lack of such a program was a major cause of the high rate of noncompliance. The GAO was concerned that continued noncompliance with these policies might result in the deployment of service members with health problems, or delays in obtaining care when they return.

Based on these findings, the GAO recommended that the Secretary of Defense direct the Assistant Secretary of Defense for Health Affairs to establish an effective quality assurance program that would help ensure that the military services comply with the force health protection and surveillance requirements for all service

Army Force Health Protection: Past, Present, and Future

members. The DoD concurred with this recommendation.

In November 2003, The Surgeon General of the Army tasked the US Army Center for Health Promotion and Preventive Medicine (USACHPPM) with the development of a quality assurance program for deployment health. The Army Deployment Health Quality Assurance (DHQA) Program was designed to provide a capacity for on-site record reviews as well as a system for accountability (compliance with standards and public law), quality assurance, and reporting.

Late in 2003, USACHPPM sent 2 teams to conduct the first Army deployment health quality assurance site visits at Fort Stewart, Fort Drum, Fort Lewis, Fort Hood, and Fort McCoy. The visits consisted of reviews of outpatient records, discussions with medical staff and medical support staff, and visits to deployment processing centers. During these first visits, the teams found a general lack of knowledge among medical staff and medical support staff regarding deployment health policies and requirements for deploying Soldiers. At that time, the deployment health assessment forms were completed by hand, in triplicate, and the copies were forwarded to the Army Medical Surveillance Activity (AMSA). Once received, the forms were scanned into a centralized electronic database.

In January 2004, The Assistant Secretary of Defense for Health Affairs issued *HA Policy 04-001*,³ which outlined specific guidance for the DoD Deployment Health Quality Assurance Program. The major requirements of this policy included

- Reports on centralized pre- and postdeployment health assessments
- Reports on service-specific deployment health quality assurance programs
- Visits to military installations to assess deployment health compliance and effectiveness
- Major findings and recommendations summarized in an annual report and coordinated through the Force Health Protection Council

PROGRESS SINCE 2003

Chapter 7 of *The Department of the Army Personnel Policy Guidance* (PPG)⁴ and *Department of Defense Instruction 6490.03*⁵ serve as references for compli-

ance standards, metrics, and reporting requirements for Army DHQA activities. The PPG is updated frequently and is reviewed routinely for the latest guidance.

Current requirements of the Army DHQA program include, but are not limited to

♦ Deployment health assessments

- A predeployment health assessment (DD Form 2795) must be completed for all Soldiers and Department of the Army (DA) civilians before a major deployment, as prescribed by DoD and DA policy, and archived electronically at the Armed Forces Health Surveillance Center (AFHSC) (formerly AMSA). The required method for completing and forwarding deployment health forms is the Army Medical Department Medical Protection System (MEDPROS).
- A postdeployment health assessment (DD Form 2796) must be completed for all Soldiers and DA civilians upon redeployment as prescribed by DoD and DA policy, and archived electronically at AFHSC.
- A postdeployment health reassessment (DD Form 2900) must be completed for all Soldiers and DA civilians upon redeployment as prescribed by DoD and DA policy and archived electronically at AFHSC.

- ♦ Deployment serum specimens. A predeployment serum specimen must be drawn for all Soldiers and DA civilians as prescribed by DoD and DA policy and forwarded to AFHSC for storage in the DoD Serum Repository (DoDSR). Similarly, a postdeployment serum specimen must be drawn for all Soldiers and DA civilians as prescribed by DoD and DA policy and forwarded to AFHSC for storage in the DoDSR.

- ♦ Immunizations. A record of each immunization required for deployment will be documented using MEDPROS. Immunization requirements vary by deployment destination (for specific guidance, see *Army Regulation 40-562*⁶ and the PPG⁴).

- ♦ Screening tests. A record of predeployment testing for tuberculosis infection and human immunodeficiency virus infection, performed as prescribed by DoD and DA policy, will be recorded

using MEDPROS. A record of testing for deployment-related tuberculosis infection, as prescribed by DoD and DA policy, will also be recorded using MEDPROS.

- ◆ Deployment health care. Health care provided during deployment must be documented either electronically, where available, or on appropriate forms (eg, DD Form 2766 and SF600).
- ◆ Other metrics as required

Key elements of the Army DHQA program:

- ◆ Periodic status reports on centralized data and serum specimens. AFHSC provides reports as required on deployment health assessment data to the Force Health Protection Quality Assurance coordinator at the Office of the Deputy Assistant Secretary of Defense for Force Health Protection and Readiness (DASD/FHP&R).
- ◆ Site assistance visits to assess deployment health programs.
 - Onsite assistance visits complement the corporate-level periodic reports. Site visits also provide the opportunity to obtain an operational perspective on the deployment health program, identify the most efficient and effective practices, and highlight quality assurance and process improvement activities.
 - The timing, site selection, and scope of the site visits are determined by need and current issues. Visits are designed to maximize utilization of staff resources while minimizing interruption of installation activities.

Since 2003, a team from USACHPPM has visited approximately one Army installation per quarter, including one visit per year with a team from DASD/FHP&R. These visits focus primarily on force projection sites and have included, among others, Fort Bragg and Fort Bliss, as well as return visits to Fort Drum, Fort McCoy, and Fort Lewis. USACHPPM also visited the US Army Corp of Engineers Headquarters in Winchester, VA, at their request, to provide guidance and recommendations for deploying DA civilian engineers.

USACHPPM, with assistance from AFHSC, provides all required reports to DASD/FHP&R on the Army's deployment health quality assurance program. Over time, there has been remarkable improvement noted in

deployment health metrics and practices. Electronic completion and capture of deployment related health forms, archiving deployment health related forms and data in the centralized database at AFHSC, and the use of systems like MEDPROS to document and monitor deployment health related requirements have all improved dramatically.

MEDPROS was developed by the Army Medical Department to track all immunizations, medical readiness, and deployment data for all active duty and reserve component Soldiers of the Army, as well as DA civilians. It is a powerful tool allowing the chain of command to determine the medical and dental readiness of individuals, units, and task forces. Commanders and leaders at various levels are responsible for the use and implementation of MEDPROS to monitor their units and/or individual readiness status.

Comprehensive medical readiness data in MEDPROS includes all medical and dental readiness requirements. Included are immunizations, permanent physical profiles, eyeglasses, blood type, medical warning tags, medications, pregnancy screening, DNA, HIV, and dental status. Deployment health assessment forms can now be completed electronically using the MEDPROS link in the "My Medical" tab on the Army Knowledge Online website. These forms are automatically forwarded electronically to AFHSC to be archived in the central database.

FUTURE DIRECTIONS

*Department of Defense Instruction 6200.05*⁷ implements policy, assigns responsibilities, and prescribes procedures for establishing a comprehensive DoD Force Health Protection Quality Assurance (FHPQA) Program; and expands deployment health quality assurance activities by applying FHPQA to key elements throughout the entire period of an individual's military service. The DoD FHPQA Program is designed to ensure that the health of service members, as well as applicable DoD civilian and contractor personnel, is effectively monitored, protected, sustained, and improved across the full range of military activities and operations.

FHPQA is focused on:

- The promotion and sustainment of a healthy and fit force.

Army Force Health Protection: Past, Present, and Future

- The prevention of illness and injuries, and protection of the force from health threats.
- The provision of medical and rehabilitative care to the sick and injured.

CONCLUSION

The Army remains committed to providing quality health care and maximum protection to its Soldiers, regardless of geographic location and circumstances. The new Force Health Protection Quality Assurance Program is a force multiplier, designed to provide not only a system for accountability (compliance with standards), but also a system to assure quality and continuous improvement in the care provided to our Soldiers and DA civilians throughout their careers.

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